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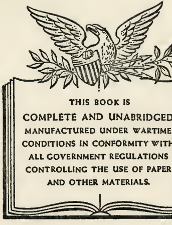

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# Doctors Aweigh

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REAR ADMIRAL CHARLES M. OMAN (MC), U.S.N.

# Doctors Aweigh

## THE STORY OF THE UNITED STATES NAVY MEDICAL CORPS IN ACTION

> There are three sorts of people: those who are alive, those who are dead, and those who are at sea.
>
> ANACHARSIS, 600 B.C.

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DEDICATED TO

All the Officers

and the Enlisted Personnel of the

Medical Department of the United States Navy

who are on duty at sea and ashore in all parts of the world, and whose daily service to the sick and injured in our armed forces is too great a story to be told within a single book.

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The opinions expressed in this book are those of the writer, and are not to be construed as official, or in any way reflecting the views of the Navy Department or of the naval service at large.

# ACKNOWLEDGMENT

I want to express my thanks to Miss Dorothy Giles for her assistance in collecting and arranging the mass of material which has gone into the making of this book.

# Foreword

"DOCTORS AWEIGH" should prove extremely interesting to all members of the Navy Medical Corps and to the general reading public. The author, Rear Admiral Charles M. Oman, Medical Corps, United States Navy, has long been one of the representative officers of the Medical Department of the Navy.

His naval career has been a varied one, professionally and geographically. His first duty took him to the Philippines during the time of the insurrection. He had firsthand information of warfare as practiced by the Igorots and Moros, and so had his first taste of war surgery and tropical diseases in that part of the world. He was present at the tremendous earthquake in Messina in 1908 and did a great deal in the relief work among the wounded in that catastrophe. During World War I he was the commanding officer of the hospital ship *Comfort* and later commanded the Naval Base Hospital No. 1 at Brest, France. He was awarded the Navy Cross for his services in that war. Other duties took him to China and then back to the continental United States where he was the commanding officer of a number of large naval hospitals. In 1942 he commissioned, and was the first commanding officer of, the National Naval Medical Center at Bethesda, Maryland.

From this rounded service *Doctors Aweigh* will bring forth events of interest to everyone in the medical profession of this country—young and old, and be of special interest to relatives and friends of members of the armed forces.

Ross T. McIntire
*Rear Admiral, Medical Corps, U.S.N.*
*The Surgeon General of the Navy*

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# Introduction

ONE OF THE characteristics of our time is the desire to *know*. From all sides and from all groups of people of all ages comes a clamor for facts. For many generations medicine and surgery were Delphic mysteries, not to be revealed except to the initiated. But in the quarter century since the first bout of this war for human freedom all this has changed. Instead of the old hush-hush about many of the functions of the body and the diseases which attack it, a searchlight has been thrown on these matters. Today everybody is endocrine- and vitamin-conscious. Most Americans are more familiar with the setting and scenery of the alimentary canal than with the great gut of Panama.

Sometimes, to one like myself who has been trained in the older, more conservative school, this interest is more than a little disconcerting. As, for example, when a beautiful young woman comes up to you at a cocktail party and says with a flutter of her eyelashes, "Oh, Admiral Oman, so you are a Navy doctor? Then won't you tell me something about venereal diseases?"

One day a very lovely, intelligent, and talented movie actress called on me. She was most interested in the health problems we have to meet, and we discussed clothing, food, amusements, and a vast variety of subjects. What was apparently the most interesting subject—that of venereal diseases—was then approached. She said she had heard that the "sulfa" drugs were working miracles in curing gonorrhea.

"Yes," I said, "they are."

In fact, the admission rate for this condition has been markedly reduced, and the wards in Navy hospitals assigned to these diseases are rather sparsely occupied. However, as I remarked: "There is still something far more efficacious than the 'sulfa' drugs, and that is 'self-denial.' "

However, I am convinced that the lady I have just referred to is one of the isolated cases. The general public interest in medical matters today is not a morbid and sadistic curiosity. It is one more symptom of the trend of public thought, which is to demand more and more accurate and authentic information about whatever concerns the public good.

Essentially, the health of our Navy is a matter in which every thinking American must be concerned.

We have always carried out a program of health education. It is laid down in Navy regulations that the officers and men shall be instructed in personal hygiene, First Aid, and some of the simple laws of preventive medicine. This instruction, also according to regulations, is carried on by the medical officers of the Navy. How important and valuable this program is, is being shown in the daily communiqués from the naval battle fronts, telling of men who are able not only to help their wounded comrades, but to survive shipwrecks, weeks of exposure on rafts, and being cast up on tropical islands where the water supply is questionable at best, and where many tropical diseases are endemic. What brings these men through these trials and dangers is not only their American intestinal fortitude, all of them are armed with knowledge. Somewhere, aboard ship, in naval training stations, or in "boot" camps, doctors wearing the Navy's blue and the gold oak leaves and silver acorns which are the insignia of the Navy Medical Corps have taught these men how to protect themselves, if possible, from infection and disease.

The story I have to tell here is the story of these seagoing doctors and their work. That work goes on in time of peace no less than in time of war. Naturally, it is a story which only a medical officer of the Navy can tell.

About forty-five years ago two brothers, born in a small town in Pennsylvania, set out from home to seek their fortunes on the seas. One, Joseph Wallace Oman, had an appointment to Annapolis. The other, myself, took the longer road, which led through the University of Pennsylvania's Medical School. Six months after graduation I was commissioned assistant surgeon in the United States Navy. That was in February 1902. A month later I had my orders to accompany a detachment of Marines to an Asiatic station. My brother was then serving as ensign aboard the U.S.S. *Helena.* Back in Pennsylvania the neighbors said, "So those two Oman boys have gone to sea," as though that marked us as a bad lot. For the intervening forty years both of us followed the sea, Wallace in the Line and I in the Medical Corps, passing through the various grades of the service until both of us attained the rank of rear admiral.

My brother has gone now, and there is only one seafaring Oman left. But the love of the sea, of the ships, and the men who sail it, which actuated both of us as boys and as men, is not diminished. It is concentrated now in me and is the primary cause of this book.

# Doctors Aweigh

CHAPTER I

# Emergency Call, Pearl Harbor

CAPTAIN HAYDEN SANG in his shower.

The sounds that rose above the gurgle and splash of the plumbing might not have been recognized by many as song, but to the captain's family the sound indicated that to the head of the house all was right with that peaceful, sunny morning of December 7, 1941.

It was one of Hawaii's brightest. Pearl Harbor was unusually full of big ships gleaming in the early-morning sun. Among the eighty-six ships of the Pacific Fleet moored there, there were eight battleships, seven cruisers, twenty-eight destroyers, and five submarines. For days the air had tingled with bugles and with something else, though less easy to define. Not in months had the base been so full and so busy.

Upstairs, in Captain Hayden's quarters, the sounds from behind the shower curtain became staccato: "K—K—K—Katy!" Like most Navy captains, Hayden's musical repertoire was of the vintage of 1918. That particular number was produced in response to a sluice of extra-cold water. Through the chattering of his own teeth he heard, suddenly, the roar of planes approaching and flying low over the quarters. This was immediately followed by a violent explosion.

Let him tell it in his own words:

"I didn't pay much attention to this. The Naval Hospital is located alongside the Army Air Base at Hickam Field and across the channel from the Naval Air Station on Ford Island. We had planes flying around most of the time. As we were doing some construction work in the rear of the hospital, dynamite blasts were not unusual. The explosion of three hundred to five hundred pounds of dynamite sounds about the same as the explosion of an air bomb. Then I heard more planes and more explosions. Big ones. They shook the house. Doggone it, that wasn't quite normal. Especially on a Sunday. I jumped out of the shower, threw on some clothes, and started for the window of my room. Just then my thirteen-year-old son, Billy, dashed in.

" 'They're Jap planes!' he yelled.

" 'Japs?'

" 'Sure. Take a look at them.'

"We looked out the window just as three planes went by the second floor of my quarters, only about seventy-five feet away. I could see the features of the men in them. They were Japs, all right."

That was how the Navy's Medical Corps got its call to action at Pearl Harbor. Captain Reynolds Hayden (MC), U.S.N., was commanding officer of the Naval Hospital there. How the Navy answered that call that day and has been answering it all during the progress of the war I shall try to tell as frankly and as fully as naval regulations and circumstances permit.

It was 7:55 A.M. when the first of those black vultures with the crimson ball on their wings swooped down on the Army Air Base, Hickam Field, and on the Naval Air Station on Ford Island, where our big, long-range planes were. In that early hour of the morning a number of ambulant patients were strolling around the hospital grounds, which were one of the beauty spots of Oahu. The first Jap planes zoomed low over their heads, but the fliers were too intent on reaching military objectives, before our anti-aircraft guns could get at them, to bother with these groups.

With the sound of the planes, the explosions of the first bombs, and the crackle of our own anti-aircraft batteries sounding all around him, Captain Hayden gave orders to his family to keep inside the house unless it caught fire, and started on the run across the lawn to the hospital.

Waves of enemy bombers, escorted by fighter planes, were swinging in from the southeast to concentrate their attack on the heavy ships in the West, East, and Middle Lochs. It took only a few minutes after the first bomb dropped on the Fleet for the machine guns mounted on the battleships to open fire. Inside another five minutes the anti-aircraft batteries had swung into action. The air was full of the crash of exploding bombs and torpedoes, the roar of ack-ack guns, and the twisted, flaming skeletons of wrecked planes. The harbor was a sea of oil, ablaze in many places, in which terribly charred bodies floated and men made desperate attempts to swim.

Back in the Medical C.O.'s quarters, Billy Hayden flattened his nose against the window and let out an awed, solemn whistle: "Whew! And they call *this* the Paradise of the Pacific."

On that Sunday morning there were some 500 patients in the Naval Hospital. These were men from the station and sick and injured from the ships of the Fleet then in harbor. The official rating of the institution was 506 patients. Fortunately, the Medical Department was acutely aware of the ultimate significance of the events transpiring in the Pacific. We were keeping a big fleet in the Pacific, and it looked as if we would have to continue to keep it there, and to add to it for some time to come. Pearl Harbor provided the only hospital facilities for this fleet away from the mainland, except for small naval hospitals at Guam, Samoa, and Cavite.

There was no arguing against the fact that we needed enlarged hospital facilities and an abundant supply of drugs and surgical dressings. Although certain powers in authority and the public at large may have objected to appropriations requested for purely military and naval expansion, there was always a ready and enthusiastic response to the surgeon general's request for funds to provide for an increase in hospital facilities.

The hospital at Pearl Harbor grew. One by one, here and there new corridors, outbuildings, and pavilions were provided. Medical stores were built up. In Hawaii, there are no firms manufacturing drugs or medical supplies. All these must come from the United States, and it takes time to get them there.

The value of this foresight is proved by the fact, announced by the surgeon general of the Navy, Rear Admiral Ross T. McIntire, that "at midnight of December seventh there were 960 patients in a hospital whose official rating was 506 patients. And next day nearly 100 more were received who had been temporarily cared for at emergency dressing stations."

A mobile hospital with a capacity of 600 beds had been transported to Pearl Harbor and was practically set up and was functioning on that fateful day, December 7, 1941.

Whatever criticism may be made of our defense program at Pearl Harbor, it must necessarily stop short of the matter of medical preparedness. When it came to taking care of those injured in the raid, we were right on the spot; we were well staffed and well equipped.

Thank God for that!

By the time Captain Hayden got to the hospital, the officer of the day had ordered all hands to their stations. The hospital's three ambulances and all the fire-fighting apparatus were distributed about the grounds, so that in case a bomb were dropped, all the apparatus would not be destroyed at once. The immediate demand was for as many beds as possible for the casualties of the battle then going on. There was no possible way of estimating how many these would be. As ship after ship was hit or set afire, it was all too evident that everything the hospital had wasn't going to be too much. If only it were enough!

The first casualty brought in was a man who had been walking along the road by the hospital with his wife and small child. A falling fragment of shell cut off his left arm at the shoulder, with fatal results. Miraculously, the woman and child were not hurt.

All ambulant patients were moved from the wards to hospital tents set up behind the building. A number of men decided for themselves, and without benefit of medical advice, that they were well enough to get back to their ships and into the fight. They didn't stop for uniforms. Some of these men were killed. A few were injured and ultimately turned up at the hospital again. One lanky gunner's mate, who had been under treatment for a fractured rib, got out to his ship in time to help fire his gun before a bursting torpedo shattered both his legs. They brought him back to the same ward and the same bed he had crawled out of an hour before. Through grimly set lips he muttered: "It's just a damned merry-go-round!"

There was constant danger that the hospital itself would be hit. Ten minutes after the raid began, a blazing enemy plane came down on a glide toward the center of the main building. For a minute it looked as if it would make a direct hit. Then it veered off slightly, carrying away a corner of the laboratory roof and half the animal house, to crash on the tennis courts. The pilot had been shot in the head and killed before the crash. The plane had evidently come down out of control.

About eight-thirty came a lull in the raid, when the raiding planes went back to their carrier to reload. During that respite, the first casualties began to turn up at the hospital. For the next three hours, while the enemy came back and renewed the assault, and later, the victims continued to come at an average of three a minute. They were brought to the hospital in every sort of vehicle—ambulances, military and civilian trucks, private cars, and delivery wagons. Civilians co-operated with the Navy in bringing the wounded in under fire. A pool of all vehicles was formed at the navy yard garage and moved up, two by two, to the dock to take on wounded for conveyance to the hospital and to the emergency field hospitals set up in various places.

The hospital ship *Solace* was anchored in the harbor. Some of the patients she carried had been transferred to the hospital. The white-painted ship became a mecca for the men swimming about in the oil-covered water. Approximately 141 patients were received on board the *Solace*. "Many," according to Captain George Eckert (MC), U.S.N., chief surgeon, "were so seriously burned as to be unrecognizable. Those who were conscious tried to mumble their names. But no one whimpered. Their morale was high."

At the hospital, the problem was how to handle such a flood of terribly injured men as quickly and as competently as possible. This was solved by Captain Hayden and his executive officer, who quickly examined each man brought in and assigned him to a place in one of the twelve wards or sent him directly to the operating suite.

Many patients were unconscious, or too badly injured to speak. Forty-seven per cent of all the cases brought to the hospital were burned. Many were thickly coated with fuel oil. Practically all were in a state of shock.

The Navy is a stickler for records. All through a man's career in the service, whether just for a hitch or for life, two careful, up-to-the-minute, detailed accounts are kept of him. One is his service record; the other is his health record. The service record is kept in duplicate. One set goes with him from ship to station, in the keeping of his commanding officer; the other set is kept in Washington at the Navy Department. Whenever anything happens to the man —from an abscessed tooth to a citation for distinguished service— it is immediately written into its appropriate place in his record of health or service.

In the stress and confusion of battle or during such a raid as occurred at Pearl Harbor, there is no time to search a man's health record before attending to his needs. But Navy regulations and sound common sense decree that every effort be made to keep a record of his injuries and the treatment given them, as his continued treatment and future pension claim depend on these records.

This is one of the times when the metal identification tag, which every man in the United States Navy—officer and enlisted man alike—wears about his neck, is invaluable. Here are inscribed the man's name and rating, his blood type—in case blood transfusions are necessary—and the date of his inoculation against tetanus. And, as further proof of identity, the print of his right forefinger. In addition to these data, a man who has been given first-aid treatment at a field dressing station or by a Navy hospital corpsman is promptly tagged before being sent on to the hospital. The tag tells the medical officer, who examines the patient, exactly what first-aid treatment has been given—morphine, sulfanilamide, or blood plasma.

It is enormously important that the first examination of the injured be made by a medical officer of long and extensive experience. Always there is shock to be looked for and guarded against. To send a patient to the operating room while in a state of shock is to court disaster. Abdominal and head injuries need to be wisely appraised. Many head injuries seem slight on casual examination; yet these, if not recognized and properly treated, will result in fatal complications.

All scalp wounds are serious, and sometimes it is a question for the surgeon to decide whether the metallic foreign body should be removed or not. Actually, there is a fifty-fifty chance that the man who has a bullet in his brain will develop epilepsy.

During World War I, Dr. Harvey Cushing improved the surgical technique then followed, with the result that the mortality of head wounds was reduced from 60 per cent to 20 per cent. With the use of sulfa drugs, this mortality rate has now been cut considerably lower.

Naturally, the powers of the entire hospital staff were stretched to the limit on that fateful December 7. "Though occasional shell fragments and machine-gun bullets zipped through our temporary ward building," said Captain Hayden, "all hands were so busy they had no time to think of themselves. Fortunately, nobody was injured."

For the next three days all hands worked twenty-four hours a day, snatching sleep when they could. In the operating rooms, four operating teams, two teams working at a time in relays, attended to the urgent surgical cases as rapidly as possible. For the next ten days the hospital staff was divided into watches so the work could go on continuously round the clock.

"I was proud of them," said Captain Hayden, "especially of my nurses and hospital corpsmen. Many of these were youngsters doing their first hitch. But they stood their baptism of fire well. As soon as the enemy planes started to roar over and around us, they dashed from their quarters to the main hospital building through a shower of anti-aircraft shell fragments and stray machine-gun bullets. Their first thought was to care for their patients and to get ready for those who they knew would soon be coming. After the raid, all hands worked until they dropped. You never had to keep them at it.

"Our twenty-eight nurses were especially devoted. I will always remember my chief nurse, a frail-appearing little woman who looked as though a good gust of wind would blow her away. But she was made of steel wire. She was everywhere: encouraging, supervising, directing. On Wednesday it was necessary to order her to bed to get some sleep. The staff took great pride in the fact that though we were understaffed for such a great number of serious casualties, we were able to care for our own without any outside medical assistance, except some volunteer trained nurses and 500 flasks of blood plasma from Honolulu."

The staff of the Pearl Harbor Hospital and that of the U.S.S. *Solace* were cited en masse by the commander in chief, United States Pacific Fleet, for distinguished services during, and subsequent to, the Japanese attack on December 7, 1941! There are combatant units which have been cited for gallantry in action, but this is the first time on record that the entire staff of a hospital or a hospital ship has received that honor.

Among the unsung heroes of that opening battle of the war were the hospital's Chinese galley force. Anyone who has lived in the East knows you can kill a Chinaman, but you can't surprise him. His imperturbability equals that of the Great Wall his ancestors built.

The hospital's cooks and mess boys lived up to the traditions of their race. With the great tide of seriously injured patients, slight casualties, helpers, and stray sailors whose ships had been blown up and who didn't know where to go, turning up at the hospital, every inch of space inside and out was crowded. Yet, somehow, by some miracle and the equanimity of the Chinese temperament, those boys served that day, between noon and 3 P.M., *4,500 Sunday dinners*. Then they pitched in and produced an equal number of suppers.

Next day they did it again. After that, the hospital was cleared of all except the patients and staff, and the housekeeping settled down to a routine.

Character and habit are what make for morale in any emergency. Sometimes force of habit produces amusing results. When the U.S.S. *Arizona* was blown up in a world-shattering explosion, the Hayden children ran excitedly to the front door to see. Automatically Mrs. Hayden called after them: "*Don't* let the mosquitoes in."

One striking difference between the medical picture presented by World War I and the one we are fighting today lies in the enormously increased number of burn cases. As a result of modern warfare, burns have become a major casualty. Of the patients sent to the Pearl Harbor Hospital, 254 were burn cases.

Practically all these were flash burns, caused by the temporary but intense heat from exploding bombs or torpedoes. These were preponderantly second-degree burns, and many burns covered some 80 per cent of the body surface.

It was immediately noticeable that those parts of the body surface which were covered by any kind of clothing, even the lightest skivvy shirt or cotton shorts, were not burned. When the attack occurred, many men aboard ship were below deck and in various stages of undress. At the call of "battle stations," they ran to their stations without waiting to pull on their clothes. Some wore trousers and no shirts. Some were in their underclothes. Others wore only a pair of trunks, or sprang naked from the showers. Those wearing undershirt and trousers were burned only on the arms and face. Those with trousers but no shirts were burned over the entire body above the waist. Those wearing trunks were burned over the entire body except about the hips. This experience has led to the orders, now in force throughout the United States Navy, that at "battle stations" the men shall be fully clothed; and many wear "flash-proof" clothing.

In addition to their burns, numbers of the men had been overboard in water heavily coated with fuel oil, and were covered with it from head to foot. A number of these patients were in a state of shock, even when there was no sign of any physical injury. Those who were burned and covered with fuel oil presented a serious problem. No attempt could be made to remove the oil at the time. Immediate local treatment for the burns had to be applied over the oil.

How to remove fuel oil is a problem for extensive research. The best method found at Pearl Harbor to remove the heavy oil was by the use of a gauze or cotton sponge saturated with mineral oil. Of course this must be done slowly and with all the gentleness possible. The mineral oil leaves a thin film which, however, is not difficult to cleanse away. At least this method is preferable to the old one of using tincture of green soap. Since then some common proprietary preparations have been found to be most useful as detergents.

As soon as possible after their reception at the hospital or aboard the hospital ship all the burn cases were given a tanning process.

Aboard the *Solace* all the stainless-steel buckets available were collected in the pharmacy. One pound of tannic-acid crystals was added to each bucket of water, and these were distributed to each operating room, dressing room, and ward. In the rush, no attempt was made to observe sterile precautions. Dressings were soaked in the solution and placed on and around the burned areas and kept wet for twenty-four hours.

At the hospital, sprays of tannic acid, gentian violet, and triple dye were made up and used continuously. Everything which would spray the solution was put to use. Ordinary Flit guns were emptied, refilled with the medicated spray, and used to spray patients. Even though this tanning process was frequently applied over the fuel oil, a reasonably efficient tanning resulted.

As soon as the necessary cradles could be manufactured, each severely burned patient was placed under a heat cradle, several blue electric lights being used to supply the heat, and the cradles covered with blankets.

Why, one may ask, apply heat to bodies already terribly burned? It should be borne in mind that deaths resulting from burns are produced by shock induced by the burn and the loss of body fluid. Heat helps to prevent this. Treatment of the severely burned continued day and night until they were evacuated to the West coast ten days later.

Only the operating suite had been blacked out before the raid. But strict black-out precautions became imperative because another raid might come at any time. Ward work was therefore continued with only the dim light from blued flashlights. This made the care of the injured, especially intravenous administration of plasma, extremely difficult.

In the great majority of war injuries of no matter what kind, the primary cause of death is shock. From the earliest times, surgeons have noted a startling clinical picture which appears in patients following severe injuries or major operations. There is an almost classical group of symptoms—pallor, moist skin, rapid, feeble pulse, and a lowering of blood pressure. These indicate acute failure of the circulation. In other words: shock. Typical shock is seen following extensive surgical operations and in the victims of war wounds, burns, industrial accidents, and automobile injuries. It was a common and deadly combination in soldiers during World War I, and caused more deaths than any other single condition.

The term shock was originally applied to this condition when it occurred immediately after an injury. Later, the word came to include states of low blood pressure which might appear some hours after the injury. We now speak of primary and secondary shock. Primary shock generally follows soon after pain or injury. It resembles fainting. It is not due to hemorrhage. Secondary shock develops, insidiously, some hours *after* injury, burns, or hemorrhage. Its outstanding feature is low blood pressure. It has been found that practically every man injured during battle is in a state of shock, either real or potential. The condition is influenced or caused by hemorrhage, tissue destruction, mental trauma, fatigue, and many other factors. Shock must receive the first attention after hemorrhage is controlled.

Fortunately, today we can afford to wait and let shock be relieved before operating. I remember during World War I, when I was commanding officer of the Naval Hospital at Brest, we used to make every effort to operate on our surgical cases as soon as they were brought in to us; if possible, within the "golden period" of six hours after the injury. We believed, as the profession did then, that after that period infection was practically certain to set in, cutting down the chances of recovery. Today the sulfa drugs have extended the traditional "golden period" from six hours to from three to four days. The first time this miracle-working new drug was tested severely in a vast number of cases during conditions of war was at Pearl Harbor. "The experience," Captain Hayden said, "completely demonstrated that the free local use of sulfanilamide powder in wounds permits us safely to select the best time to operate on these patients."

All severely wounded patients also received sulfanilamide by mouth, in routine dosage, for from several days to a week after injury. In severe cases, this was a necessary adjunct to the local use of the drug.

The discovery of the "sulfa drugs" and the discovery of the use of blood plasma are the two greatest advances in war surgery since anesthesia and antisepsis were given to the world. They have put into our hands better, surer means of saving the wounded from infection and from the fatal effects of shock than those of us who served in the military hospitals during World War I ever expected to see.

The best field preventive of shock is blood plasma. It should be given to all seriously wounded patients as soon after injury as possible; certainly within from five to ten minutes after they are received at the first casualty clearing station. Transfusions of plasma, given at this time, do more to cut down the mortality from shock than any other single factor we have at hand today.

Today every ship in the United States Navy carries a large supply of dried blood plasma. Liquid plasma, ready for immediate use, is a *must* in every naval hospital. Every hospital corpsman, at battle stations, carries a first-aid kit which contains syrettes of morphine to be administered to all gravely injured and a supply of blood plasma and sterile needles for prompt intravenous therapy.

Blood plasma is human blood from which the blood cells have been removed. It has the advantage over whole blood in that it does not require typing. Also, it can be given on the field more rapidly and easily than whole blood can be transfused. The powdered plasma has only to be regenerated by the addition of distilled water, which does not have to be warmed prior to injection.

In preparing the dry plasma, the blood is processed and the plasma separated, dried, and packed in compact, waterproofed containers, ready for instant use. Liquid plasma has been transported without refrigeration from Washington to California and to Cuba for use by medical officers stationed there.

In cases where there has been considerable hemorrhage, whole blood must be administered. But even in these cases it is often wise to begin with plasma until time permits a more careful study of the patient.

There is probably no service which the civilian can render to the fighting forces so valuable as the gift of blood.

Before the raid on Pearl Harbor, both the Army and the Navy medical officers there thought that they had sufficient dried plasma on hand for any emergency. The Naval Hospital had 500 units. A unit of plasma is 250 cc. But no one had any conception of the enormous number of severely burned cases the Medical Corps would be called upon to treat, nor the tremendous amounts of plasma that would be required for these cases.

A call was sent to the Honolulu County Medical Society in the need for plasma. Their Medical Preparedness Committee, with the aid of the Chamber of Commerce, had established a plasma bank just six months before the raid occurred. By November the blood bank had attained its goal of 200 flasks of plasma. In response to appeals by the Army and Navy, seventy-five flasks were sent to the Army's Tripler General Hospital, forty-five to the Naval Hospital, and eighty flasks to Queens Hospital for civilian use.

In view of the urgent need, a radio appeal for blood donors was broadcast. The response to this was dramatic and overwhelming. For two weeks donors were bled at the rate of fifty an hour, ten hours a day, seven days a week. Every available doctor and nurse in the islands was called upon to assist. Men and women waited in line for hours to donate their blood: society women and defense workers; laborers from the docks and plantations; passengers and crews from vessels in port and, when they were able, soldiers and sailors on liberty. The question most commonly asked was, "How soon can I come again?" In these two weeks of continuous work over five thousand pints of blood were obtained for plasma: 2,500,000 cc. This answered the need until more plasma could be obtained from the mainland.

One of the vitally important lessons learned at Pearl Harbor was the necessity for hospitals or any medical activity in areas subject to enemy attack to scatter their stocks of reserve medical supplies and personnel as widely as possible.

Mobile Base Hospital No. 2 had been landed at Pearl Harbor in November. The buildings on the hill were a little more than half completed. A hundred casualties were sent up there and cared for. Naturally, the most serious cases were sent to the main naval hospital. Another temporary field hospital, staffed by medical officers and equipped with material taken from ships damaged during the raid, was set up in the large main room of the Officers' Club in the navy yard.

Immediately after the raid, plans were drawn up and carried through for setting up emergency hospitals and stores of supplies all over the reservation. A number of these were built underground. The same arrangements were carried out at Midway Island, and only just in time. When the enemy struck there, and the hospital was the first building hit, medical equipment was safe underground.

CHAPTER II

# Blood on the Coral Sea

AT PEARL HARBOR there was no lack of medical supplies or even of beds for the injured. That is a story of preparedness.

But what happens in war at sea when the medical supplies run out, or simply aren't there? What can a doctor do for his patients without a hospital or even hammocks to put them in, when the ship is rapidly blowing up under his sick bay? How can he bind up wounds or prevent infection in men who are being swept down a mountainside in Java or New Guinea in a last-minute retreat to the sea away from the enemy whose helmets can be seen rising in a wave of gray steel over the rim of the hill? With the best intentions in the world, and with all the skill a good education in medicine and surgery can bestow, what can he do to preserve life and relieve suffering when he and several hundred injured are drifting on hastily contrived rafts or clinging to bamboos and bits of wreckage in a wide, pitiless, shark-infested sea?

In the very hour that the first wave of Jap bombers came winging over Diamond Head, in the harbor of San Francisco the liner *President Polk* was making ready to sail for the Orient. She carried the rich Christmas trade, Waikiki-bound, as well as a number of wealthy Americans escaping winter by a long Pacific cruise. Also aboard her, though not one of either of these groups, was an unassuming, middle-aged American doctor, Corydon M. Wassell, Lieutenant Commander, U.S.N.R., who hailed from Little Rock, Arkansas, by way of ten years' service as a medical missionary and later as a United States Navy doctor in China. The orders he carried were to report to Admiral Thomas Hart at Cavite, P.I.

The *President Polk* sailed shortly before noon. Before her bow had passed under the Golden Gate Bridge, her radioman was listening, wide-eyed, to the reports of the raid on Pearl Harbor. The *President Polk* turned back to her pier, disembarked all civilian passengers, and turned herself over to the Army. When she sailed again, ten days later, she was an armed transport, carrying forty-eight of the first P-40s shipped to the Far East. Aboard her was Dr. Wassell. His orders still were to report to Admiral Hart. Just where Admiral Hart would be when the *President Polk* got west of the international date line remained a mystery which it was up to the doctor to solve.

The *President Polk* sailed under sealed orders. Having a speed of over twenty knots, she had no escort. If she encountered any Jap cruisers or submarines, she would have to run away from them or take it.

Ultimately the *President Polk* arrived at Brisbane where she unloaded the P-40s and took on troops and supplies to be delivered at Surabaya, Java.

In those first weeks of 1942 a lot was happening in the Malay Peninsula and the Dutch East Indies, and happening fast. Since December 10, 1941, when Jap planes sank the H.M.S. *Repulse* and *Prince of Wales* off the east coast of Malaya, the United Nations had been putting up a losing defensive against the tide of Japanese aggression. Having won supremacy of the air over the Philippines, as they did within a few days after the first attack on Manila, the Japs had begun their relentless movement southward, from one island steppingstone to the next, on the march to Singapore. In just nine weeks they seized an economic empire.

In the uncertain fortnight or so before the enemy launched his raid on Pearl Harbor, a number of American ships—cruisers and destroyers—part of the Asiatic Fleet, had put into the oil ports of Borneo. Ostensibly, they were there to refuel. Actually, the refueling process was prolonged and exaggerated by innumerable well-contrived complications which allowed our ships to linger in friendly Dutch waters until our Navy could see which way the little yellow men were going to jump.

When the Japs began to move and it was all too evident that we would lose the Philippines, these cruisers and destroyers steamed north to meet and convoy nearly fifty non-combatant ships, flying the flags of the United Nations, from the danger area of the Philippines southward.

Thus when Admiral Hart had to withdraw from Cavite, he went to Surabaya. Java became American naval headquarters in the South Pacific. From Surabaya our ships put out in forays to try to arrest Japan's march to the south. At the time ours were the only heavy ships in those waters, all the British and Dutch naval vessels being engaged guarding convoys.

All this was going on when Dr. Wassell arrived in Surabaya. He got there on January 27, just three days after one of the first engagements in Macassar Strait and when the injured from that meeting with the enemy were beginning to arrive in Java. Admiral Hart immediately appointed Dr. Wassell to his staff. There was a vacancy, as the medical officer who had been serving under Admiral Hart at Cavite had gone into Manila to help with the wounded there, was taken prisoner by the Japanese, and, consequently, left behind.

Wassell found plenty to do. All sorts of medical supplies were being dumped, helter-skelter, on the docks at Surabaya. Every sort of vessel the United Nations could commandeer was being outfitted for use against the enemy. Men, planes, guns, ammunition, and tanks were arriving hourly, as the United Nations scrambled to put up a last line of defense of the Dutch East Indies and Australia.

It was a job of trying to organize some order and plan out of preposterous chaos.

Meanwhile, American ships and seamen were endeavoring to hold Macassar Strait against the invaders. At that Thermopylae of the sea the U.S.S. *Houston* was mortally wounded and lost. The U.S.S. *Marblehead,* with her steering gear shattered and great gaping holes in her sides, limped into Surabaya, carrying survivors from the *Houston* and her own injured.

There were excellent Dutch hospitals in Surabaya, with Dutch and Javanese doctors and nurses, where our wounded and sick could be cared for as competently and carefully as in the best of American medical centers.

To Dr. Wassell fell the job of assigning patients to these institutions—officers to Darmo Hospital, ratings to the C.B.Z. (Central Civilian Hospital). These hospital staffs assumed all care of our wounded, and the American doctor wisely did not interfere. But every day he visited each institution, making the rounds of the wards, talking with the men who were able to talk, and bringing them the small, homely comforts which under such circumstances assume a value and importance out of all proportion to their intrinsic worth. It is fantastic how much morale value is compressed in a single tube of familiar, American-made shaving cream, or a five-cent chocolate bar. To those mutilated, suffering, and nerve-shattered men, the doctor with his gifts of candy, ice cream, soap, and—final touch of thoughtfulness—long Chinese cigarette holders which would allow the comforts of a smoke to men whose burned arms and hands were swathed too heavily in bandages to let them hold a cigarette, must have seemed like a kindly American uncle.

"There weren't any naval orders to buy these things," the doctor recalls. "I didn't know but what I'd get court-martialed for spending 250 guilders (about $125) of the Navy's money on ice cream and smokes. But I figured it would be worth it. So far, the Navy Department hasn't called me on the carpet for it."

Another of the doctor's duties, together with those of the chaplain of the *Houston,* was to select a site for the burial of the American dead. They chose a corner of the cemetery in Jokyokarta, up in the hills on the island's south shore. Sixty-seven officers and men from American ships lie there under the crosses the chaplain and doctor had Javanese carpenters carve, with the names and ratings of each man. There were mourners at those burials, Dutch and Javanese men and women who heaped the fresh-made mounds with exotic tropical flowers, strange to American eyes, but no less meaningful than the lilacs and snowballs and poppies associated with American Decoration Day.

Once in the midst of that grim duty the doctor stopped to stare at one of those dead faces. A Chinese face, but he knew it well. Ten years before, when the doctor was serving aboard one of the American gunboats on the Yangtze, that "boy" had come to him and begged for employment as a mess boy. For ten years he had served the United States Navy and now had died in its service.

As February wore on and nothing seemed to halt the Japanese advance, it was a foregone conclusion that the enemy's pincers would reach out and close on Java next. In Surabaya and other towns fifth columnists were active spreading reports and reporting to Tokyo all that went on. Surabaya was atwitter with whispers. Moreover, what was whispered in its bars and streets between raids on Monday was broadcast over the Tokyo radio on Wednesday and Thursday. Dutch, British, and Americans looked grimly at each other as the words came over the loud-speaker.

Orders came to Dr. Wassell from Admiral Hart to evacuate the American wounded to a town up in the hills, less vulnerable than Surabaya. It was already crowded with refugees from all parts of the island. Medical supplies were scanty. Soon they had no more boric acid and no more cotton flannel. Dr. Wassell began to use a substitute remedy, such as he had often had to use as a medical missionary in China. Meanwhile, at Tjilatjap and other ports on the south shore preparations were going on for the retreat to Australia. All anyone could hope for, now, was that as the Japs came in the front door the Americans and British could skip out the back way, leaving as little war material behind them as possible.

In this connection there is a story which deserves to be told. Fully ten years before these events there appeared in Surabaya an unpretentious Japanese fisherman who unfurled his nets and sailed his boat about the harbor, peddling the fish he caught from a crude cart. Perhaps it should have occurred to the simple Dutch residents who bought his fish that there was a reason why they were cheaper than the catch offered by the Javanese fishermen. However, Dutch thrift nullified any suspicions. The Jap fisherman prospered. His prosperity took form in a peddler's cart with which he trundled Nipponese knickknacks about the streets and to the families at the naval station. Later, the peddler's cart was exchanged for an automobile, and the peddling trips were extended into the villages in the hills along the road across the island to Jokyokarta. Everybody knew him; and everybody liked him for his courtesy, kindness, and the bargains he offered. Everyone congratulated him when he announced his embarkation on a new business venture—a five-chair barbershop in Surabaya. He got the town's best patronage, and, no doubt, as he and his assistants lathered, clipped, and shaved, the best gossip and most recent and authentic news.

It was a distinct shock to Surabayans one day, in the summer of 1941, when they found the shop closed and shuttered and its proprietor missing. . . . "It only went to prove," so they said to one another, "that you never really understand a yellow man. There's never any telling what goes on behind their little slant eyes. . . ."

The same residents of Surabaya said the same—but silently and with venom—the next time they saw their erstwhile fisherman-peddler-barber. This was when he arrived in town in the uniform of a Japanese colonel, at the head of the army of occupation.

The retreat was on. Every afternoon about four the planes came across from Broome to the landing field at Jokyokarta. The pilots climbed out stiffly, to walk a few steps and drop wearily in the dust of the field. They slept where they fell. At dusk they woke, staggered over to the Grand Hotel, which was military headquarters, for a meal. During the long, five-course dinner of East Indian tradition, which even war did not disturb, they would fall asleep again, pillowing their young heads on the tablecloth. Between eleven and one that same night they would take off: running the steady ferry service, transporting unexpendable officers and men, precious papers, supplies, and gold to Australia. The next day they would be back again. Nobody got any days off.

The men who were moved by plane had to be supplied with rations for the trip and for the additional three days' trek from Broome to Alice Springs. The solution of this problem was added to Dr. Wassell's various and varied duties. Working with the purchasing department of Colonel Eubank's forces, which was made up of all Standard Oil and American Tobacco representatives in Java, he went everywhere in the island buying up every available tin of food on the storekeepers' shelves. Tins of herring, cheese, pickles, fruit, hors d'oeuvres, cans of American corn, peas, and tomatoes, Japanese and Norwegian sardines, olives—every sort of food that comes in a can. The tins were taken in army trucks to the landing field and dumped. Every man evacuated from Java was told to fill his pockets from the dump, with the warning that the food he could carry with him would be all the rations he could expect to get until he reached Alice Springs.

Then came orders from Admiral Hart: "Evacuate all wounded who can stand a hard trip." The doctor read the orders through a second time, and a third. What did the admiral mean by "a hard trip"? What kind of strain would be put on these men, some of whom were in a state bordering on shell shock in which they easily became hysterical? Could men in such plight stand the journey by plane, or crowded into a small ship, to Australia? Could they risk being torpedoed and flung into the sea? Between such hazards and the eventuality of falling captive to the Japs, which was the lesser evil? As the doctor went into the wards, every

American face that looked up at him from the beds begged for a chance of escape.

The doctor sorted them. Most surgeons would have declared it nothing short of murder to put such sick men on the road. Dr. Wassell was counting on their will to get through to preserve them on that journey. But there were ten men, including Lieutenant Commander William Goggins, executive officer of the U.S.S. *Marblehead,* whose state was so serious that transporting them was not to be thought of. Those ten would have to be left behind.

The doctor got the others dressed and over to the embarkation depot.

"How about you?" he was asked.

"I'm staying. With the ten."

"But a medical officer is needed to look out for these men."

"They'll get along. They all have fresh dressings. And they can help each other."

The doctor went slowly back through the February rain to his quarters at the Grand Hotel. Now there was nothing to do but wait—wait for the Japs to come up the road from Surabaya and take the hill town as they had taken the port.

Much of his time he spent at the hospital with the ten Americans whose eyes questioned him mutely each time he appeared: "Have they come yet?"

"See if you can't dig up some way of getting us out of this," Bill Goggins pleaded, and cursed the bandages on his burned arms and hands which made him helpless.

"The way I figured it," Dr. Wassell explained, "was if I could find a way of getting those ten men out of Java while the getting was good—a way they could stand in the state they were in—there wasn't any reason on earth why I shouldn't."

So he went poking about in the confusion and debris of the landing field on which the advance waves of Jap bombers were dropping high explosives every day and which the Dutch were impatient to blow up to keep the Japs from eventually landing on it. In a partly demolished shed he found a dozen expensive and powerful motion-picture cameras, and stopped long enough to smash them. Then, somewhere under the rubbish, he discovered a brand-new and uninjured four-engined plane. Here was the way out. He had only to find a pilot and get his wounded aboard. He started on a run for headquarters in the Grand Hotel.

Boom!

Crash! Flames and smoke behind him, close enough to singe his coattails. The shed that housed the plane was a blazing ruin.

He couldn't face Goggins and the others right away after that. Instead, he joined the last stragglers in the Grand Hotel. That was how he happened to be on hand when a British colonel came in with the word he was trying to get a motor caravan of anti-aircraft batteries over the pass to Tjilatjap. The doctor marched up to him.

"Can you take me and ten American wounded?" he demanded.

The colonel said he could. "If you get them here inside of twenty minutes. We can't wait. The Japs are on our tails now."

"They'll be here," Wassell promised, and sprinted for the hospital.

He told it to members of the Medical Corps in Washington months later as follows:

"A Dutch rating at the hospital helped me put fresh dressings on the burn cases. All we had to use was sulphur ointment, and not enough of that. We did the best we could to make the men fit for evacuation. The rating stole mattresses and we carried them on them to the caravan. That Dutch hospital corpsman was a hero. I slipped a 25-guilder note into his hand and kissed him on both cheeks. And, gentlemen, I'm not ashamed of it. We made places in the caravan for our wounded so they could travel with as little pain as possible. Just the same it was going to be a hard trip for some of them. The worst was their nerves. The injuries they had sustained, plus the anxiety and the knowledge the Japs were nearly on us, had produced cases of severe war neurosis. Big, strapping fellows, and yet ready to cry if you spoke sharp to them. Like babies, they were.

You had to treat them like that. Think for them. Tell them just what to do. Then to do it.

"From somewhere somebody found a brand-new Ford—all gassed and oiled, ready to go. It had been delivered for our Army and never used. I appropriated it. The three worst cases—a man with a compound fracture of the leg, one with a shattered elbow in a splint, and a seaman who had shrapnel in the bladder—I put in the back seat. Bill Goggins got in beside me. I swung the Ford into line to follow the last car of the caravan. We started.

"Most of it was driving in the dark with dimmed lights. We dared not attract Jap planes. The road was terrible, rutted and blown into shell holes in places. The red taillight of the car ahead bobbed and swung like a drunken man's lantern. Anyway, that road over the mountains down to Tjilatjap is like a roller coaster. It got on Bill Goggins' nerves. He said he could stand the Japs' fire better than he could stand my driving. He kept begging me to let him take the wheel. But he wasn't fit to hold it. Besides, I was doing all right. It was his nerves.

"After a few hours' going, the boy with the shattered elbow pleaded to be let out. The jolting he was getting, and being crowded so in the back seat, put him in agony. A British Tommy, riding a motorcycle, offered to take him in his sidecar, which they figured would be less painful. But in the dark, the Tommy crashed and had to wait for morning to make repairs and come after the rest of the caravan. Our boy elected to stay with him. We never saw either of them again. I guess the Japs caught them.

"Finally, after driving all night and part of the next day, the caravan got to Tjilatjap. . . ."

In the harbor a small Dutch coastal vessel was making ready to put out. At best, she could carry one hundred and fifty. Nearly eight hundred persons were aboard her. Every ship that could put to sea had gone; many to destruction. Of the five which sailed the day before, three were sunk by the Japs while still in sight of land.

Dr. Wassell, followed by men carrying his nine patients on their mattresses, marched down the gangplank and demanded passage. The captain just threw up his hands. "My God, man! If you can find an inch anywhere!"

The doctor found it. The wounded were laid on deck and he did what he could without drugs or fresh dressings to make them comfortable. At night the ship sailed under a tropical moon, which lighted up the sea like polished glass and made the little five-and-a-half-knot ship an easy mark. But the night passed without incident. In the dawn, as they were nosing westward toward the Indian Ocean, suddenly a flight of twenty-seven enemy planes were sighted. The planes were searching the sea for American ships. They deemed the little vessel worth a bomb or two and a spray of machine-gun bullets across her deck before they flew on in quest of bigger prey.

Severely crippled, and with dead and wounded aboard, the ship limped into the nearest port to bind up her wounds. There the captain put it up to his passengers. He intended to make the run to Australia, though he figured there was only one chance in a thousand of getting there. Those who wanted to make the run with him could have free passage, provided they were willing to work. About 80 per cent of those aboard decided against it. The dangers of shipwreck outweighed capture by the Japs.

"It wasn't anything I felt I had a right to decide for my nine Americans," said Dr. Wassell. "I went down to where they were and put it up to them. Did they want to take the chance at sea, knowing its practically certain dangers, and in the condition they were in, or stay behind? To a man they voted for sticking with the ship."

The ship set out for Perth. Only then was it found that the captain had no chart to sail by. The only map of the Indian Ocean aboard was in a Rand-McNally pocket atlas belonging to a newspaper correspondent. A large piece of paper was produced, and a pencil and ruler. The paper was spread out on the deck and ruled off in squares. Commander Goggins and two Dutch officers proceeded to lay out a course. It was decided to sail N. by N.W. for two days, hoping in this way to evade the Jap submarines which had already take toll of the U.S.S. *Langley* off the coast.

The ruse worked. So did Goggins' chart. In the two anxiety-filled weeks it took the little ship to cross the Indian Ocean, bets were made as to when, if ever, they would make Perth. Bill Goggins laid his money on 4:30 P.M. on March 15. The ship nosed up against the pier at exactly four twenty-five on that day. It was nice navigation, worthy of the U.S.S. *Marblehead's* exec.

At that time the defenders of Bataan were making their last desperate stand. Submarines were running from Australian ports, carrying food, drugs, and what supplies could be assembled, for the men on Bataan and Corregidor. At the storehouse in Freemantle Dr. Wassell and two chief pharmacists set up a base of medical supplies. They scoured Australia for every vitamin pill and preparation, every grain of morphine and quinine that could be bought or commandeered. These they had ready for the submarines when they started north on their relief errands.

Meanwhile, in an Australian hospital between Perth and Freemantle, the nine Americans who had come out of Java made their recovery. Not one man had become infected during that long and dangerous trip. In the fifteen days they were aboard ship, the doctor had been unable to change their dressings. "Two or three times a day I'd go over them, smelling them. I figured as long as they smelled all right, I'd leave them alone. If they got to smelling bad, all I had to use was a small quantity of sulphur and the ship's supply of butter. I'd have to fall back on the kind of medicine our pioneer ancestors used—like I saw used in Arkansas when I was a boy growing up there."

(Growing up in the same town and the same church as a boy named Douglas MacArthur.)

Not a man of them is the worse for that journey today.

Dr. Wassell was awarded the Navy Cross with the citation:

> For especially meritorious conduct, devotion to duty, and utter disregard of personal safety while in imminent contact with enemy forces and under attack from enemy aircraft in caring for and evacuating the wounded of the United States Navy under his charge in Java, Netherlands East Indies, about March 1, 1942.

The battleships are the glamour girls of the Fleet. After them come the svelte, smart cruisers; then the vixen destroyers and the bulldogging submarines. These get the front page when the stories are told. Less publicized, but no less important in the long, arduous job of making naval war, are the supply ships; especially the fleet tankers which keep these other ships supplied at sea for long periods.

This is the story of the U.S.S. *Pecos,* one of the fleet tankers which operated in the southern Pacific in the days when the Japanese were sweeping south.

The *Pecos* was in and out of Surabaya after the battle of Macassar Strait. As it became all too clear that Java was the next item on the Japs' list, the race began to salvage all valuable war materials and get them away to the fighting ships and to Australia before the Japs moved in. In Tjilatjap, the *Pecos* stayed on as she had the last source of fuel in that area. Rather than dump it in the storage tanks on the beach, and run the chance of the Japs getting it, she stayed until she had refueled all of the ships in that area. When she left Tjilatjap, she had only about 4,000 barrels of fuel left, and the original mission was to try to get some more. (Where, is still a military secret.) It was during this stay in Tjilatjap that the *Pecos'* medical officer, Lieutenant Joseph L. Yon (MC), U.S.N., became acquainted with Dr. Wassell. They worked together on the injured men from the *Marblehead* and the *Houston,* who had been brought to Tjilatjap.

As the *Pecos* reached the mouth of the river going out of Tjilatjap, she received word that the U.S.S. *Langley* had been bombed not far off the South Java coast. Two American destroyers had picked up the four hundred and fifty survivors. The *Pecos* was given orders to proceed to the lee of Christmas Island, which lies about two hundred and fifty miles south of Java in the Indian Ocean, whither the two destroyers preceded her, and to take on the *Langley's* survivors.

As Dr. Yon told the story: "We came to the harbor on the south side of Christmas Island in the morning about half-past eight. There was a rapid tide. We could see the two destroyers lying offshore. The Dutch pilot came out and was just coming up the ladder when the sky lookout shouted: 'Enemy planes.' Looking up, we saw that there were three planes in the flight. They circled in preparation for a run on the *Pecos* and the two destroyers. As soon as the air-raid alarm sounded, we got under way again and started to zigzag at top speed. As luck had it, a rain squall came up just at that time. Those things happen fast in the rainy season in the tropics. The cloud was low over the harbor, and our skipper kept the *Pecos* under it, out of sight of the enemy. We weaved about over the harbor like the craziest jitterbug. The planes couldn't find us. We could hear bombs exploding near by and hoped that they had not hit one of the destroyers. We learned later that the two destroyers had taken advantage of the low clouds and sneaked out to sea. The squall lasted about an hour. When it was over and the sun began to steam on the tin roofs of the little town, we could see the warehouses and shipping along the water front blazing where the bombs were dropped meant for us. The planes were gone, but we figured they'd be coming back soon. It seemed likely they came from a carrier not far off.

"Our skipper put out to sea, and soon we fell in with the destroyers, which were waiting for us outside the harbor. We headed almost due south all the rest of the day and that night until four o'clock the next morning. Then we hove to, and the destroyers came alongside one at a time to transfer the survivors of the *Langley* to the *Pecos*. There were heavy swells; and in those waters you do not use much light at night if you expect to stay afloat for long. The boatswain got one of the motor launches away and made trip after trip to the destroyers, which were lying as close alongside as was safe, bringing back a load of survivors each time. Have you ever seen a small boat bump against a large ship in heavy weather? Then you know the job the boatswain had holding the motor launch steady in the dark while lines were secured to Stokes stretchers and the wounded hauled aboard.

"Prior to the boat's return from the first trip, cargo nets had been secured to the side of the ship, and men stood by with hand lines with loops in the end of them to help the men up the side of the *Pecos*. All of the survivors from the two destroyers had been transferred by 6:30 A.M., and the *Pecos* then got under way again. With all of this, there was not one word of discontent. The ship's cooks on the *Pecos* had prepared 'mud' for all hands, and within a few minutes the men were settled about the ship drinking the coffee and swapping stories.

"Our job then was to head for the coast of Australia and land the *Langley's* men. Many of them were injured. Practically all were suffering from shock, exposure, and exhaustion, from being bombed and in the water before the destroyers picked them up. Many had no clothes except those that the crews of the destroyers had contributed. . . ."

There is nothing remotely approaching luxury aboard a fleet tanker, and not too much room anywhere. In the cramped sick bay, Dr. Yon set to work to sort the injured men and to assign his five hospital corpsmen to the job of helping him treat those requiring immediate attention. Treating men who are seriously injured in a large, well-equipped hospital ashore, where it is possible to give them the absolute rest they require, is one thing. Treating them in a small and crowded sick bay aboard ship, and while that ship is running at full speed in a danger zone, knowing that the enemy may renew their attack again at any moment, and that the patients may have to be put over the side on rafts or merely in life jackets, is another story.

All of these problems, and others as urgent, were present in the sick bay of the *Pecos*. With luck, and no Japs to interfere, the *Pecos* might expect to make a west Australian port in a week. There the injured could be moved to a hospital. Meanwhile, there was the need to treat burns, overcome shock, attend to those urgently in need of surgery, set fractures, and prevent the other injuries from growing worse.

It lacked a few minutes of noon when the ship's siren warned all below decks that the enemy had returned. Less than a minute later the first bomb hit the ship. It tore a hole amidships, where a fire started. The tanker's anti-aircraft guns barked and yapped viciously. At the same time, she began to curvet and prance like a frightened horse, as the skipper endeavored to keep her from being an easy target.

There were nine attacking planes—undoubtedly from the same carrier that had sighted the American ships at Christmas Island the day before. Now they had come back with a fresh load of death. According to ritual, they separated into threes, and then peeled off one at a time from this formation. Meanwhile, high overhead, and well out of reach of anti-aircraft fire, a scout plane hung against the blue, cloudless sky, keeping watch. "Photo Joe," the men nicknamed him.

There was a horrible, mathematical accuracy about the method of attack. Down came the planes, launching their missiles, only to rise and come back again to let go the rest of the load. When all nine had discharged their explosives, they took wing back to the carrier to reload, leaving the scout plane on watch.

"Like a damned buzzard," was the way Yon put it.

They made three runs, with about an hour between the second and third. First and last, they hit the tanker five times, with six near-misses that sent up columns of water twenty feet higher than the deck, and dropped back on it with the crash of thunder and a thump like a knockout blow. One of the hits tore away the foremast and radio antenna. Others inflicted mortal wounds forward. The *Pecos* began to settle at the bow. Men in that part of the ship who had been injured could not get back to the main dressing station. The pharmacist's mate who had the forward dressing station had to carry on alone.

Several fires broke out, but the men put them out before they got beyond control. Smoke and fumes spread through the ship. Up on deck, the crippled batteries kept up a valiant fire at the planes.

The sick bay was crowded. Sailors struggled down the ladder, carrying burned and bleeding comrades. There seemed no end to the havoc.

The ship was listing badly. The deck of the sick bay slanted like a toboggan slide. One of the hits had jolted the operating table loose and sent it crashing into the bulkhead. The deck was covered with scattered surgical instruments. Each time a bomb hit the ship, or water broke over her, the vibration threatened to smash everything in the sick bay. Tile from the operating room began to chip and fly about.

The doctor and the chief pharmacist's mate who was assisting him lifted the patient onto the deck and knelt beside him. The chief held him steady while the doctor worked. Yon worked with one ear cocked for the bark of the *Pecos'* guns. He told me:

"When I heard the machine guns and the anti-aircraft guns begin to rattle, I knew that we had about thirty seconds before we either had another hit or a near-miss. We would give them about ten seconds and then drop alongside the patient, the chief on one side and I on the other, and wait for the ship to jump. From where we were in the sick bay, it was hard to tell whether it was a hit or a near-miss. A near-miss is one which is close enough to the ship to damage her when it explodes. About the only way we could tell was that on a direct hit it seemed that there was more metal flying and the ship seemed to jump a little more sharply. As soon as the ship ceased shuddering, we got onto our knees and began to work on the injured until the next bomb was due. Often this was less than a minute."

After four hours of this, the orders came: "Abandon ship!" From the sick bay, the injured men were carried up the slanting deck to the starboard side of the ship. Life jackets were put on them. Sailors jerked the kapok-filled mattresses from the officers' berths, and the most severely injured men were lashed to these and lowered over the side. A well man went with every injured one, to look out for him.

"The most impressive thing about the whole business," Yon recalled, "was the men's willingness to help each other. There never was any thought of each man for himself. And you never had to tell a man to do something for one of the injured. Every member of the crew seemed to feel a personal responsibility for the others, and for the fellows from the *Langley,* who were getting their second shipwreck inside of two days."

One disadvantage of steel ships is that they offer so little floatable wreckage. The men tore down the doors, broke out all the wooden panels, and flung them over the side. Dr. Yon's eyes fell on the chart box in the captain's cabin. It was fully six feet long and two feet square. He wrenched it off the wall, and by the time it floated to the ship's bow, there were six men clinging to it.

Before sailing from Tjilatjap, the skipper had taken aboard a lot of lengths of bamboo, big ones, cut in ten-foot lengths. These were laid on the boat davits. As the *Pecos* sank, the water washed the bamboos overboard, which provided further valuable wreckage for the men to cling to. One bamboo would support at least four men.

"The trouble with a life jacket," said Yon, "is that after it gets wet, it gets heavy, and as you hang in it, it chafes you under the arms. It helps a lot to have something to rest your elbows on. Those lengths of bamboo were just the thing."

It was five minutes to four that afternoon when the *Pecos* went down. The Jap planes had decided their job was done, and had gone. Photo Joe hung around for a short time, to make sure the ship had sunk, and then took off after them.

The sea was very wide and empty. The afternoon sun blazed down upon it. Nobody liked to remember that there are sharks in the Indian Ocean. The men did their best to keep together in groups. There was only a forlorn hope that one of the destroyers might come back that way and sight them. If the destroyers did not come . . .

The doctor had emptied the scuttle butt in the captain's cabin into some available containers, and gave these to the men, to take over the side with them to give to their injured companions.

The afternoon wore away. Soon, and quickly, the dark would cover the sea. Night in the tropics can be piercingly cold.

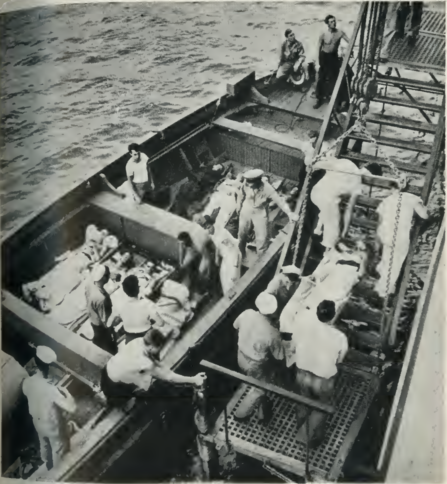
The dusk was already settling, though the west was aflame, when someone spotted a dark blur on the horizon—a ship, but whether our own or one of the enemy's, there was no way of knowing. "By that time we didn't much care," Yon confessed.

A flare was let off. There was an agonizing moment of waiting to see if it was seen and answered. Then a speck of light shone against the dark of the ship. She came on toward them.

It was one of the American destroyers which had given them the *Langley* survivors that morning. The destroyer came up as close to the men in the water as she could. Rope cargo nets were lowered over her side for men to cling to and pull themselves up out of the water.

"It wasn't until I got hold of the net that I knew how tired I was," said Yon. "I just couldn't pull myself up the side of the destroyer. I just hung onto the net. There were a lot of men in the same state. They had to throw ropes over to us and we caught hold, and the destroyer's crew pulled us up and over until we dropped on the deck.

"Most of us had nothing on but our life jackets and shorts. There weren't ten pairs of pants in the lot. Men had kicked them off to make swimming easier. The crew of the destroyer looked at us



*Press Association, Inc.*

MEMBERS OF CREW OF U.S.S. *SOLACE* CARRYING INJURED FROM UNITED STATES ISLAND BASE ABOARD HOSPITAL SHIP

*Official United States Navy photograph*

NAVY PHYSICIAN AND PHARMACIST'S MATE TREATING MEMBER OF AIRPLANE CARRIER CREW sadly. Here they'd fitted out the survivors of the *Langley* two days ago, and now here were a lot of those, plus what were left of the crew of the *Pecos,* landed naked on their hands again. But they dug deep into their lockers and found garments of some description for all of us.

"When I got aboard the destroyer, there being no medical officer aboard [now there is a medical officer aboard every destroyer], the chief pharmacist's mate had all his medical gear laid out in the officers' wardroom; and on the wardroom table we went to work. It was about one o'clock the next morning when all of the injured were taken care of and placed in the bunks, readily given up by members of the destroyer's crew.

"The destroyer had been making top speed away from the area in which the *Pecos* had gone down, and those who have been at sea can visualize how one of these small, slim ships, doing better than thirty knots in heavy swells, will roll and pitch. But as I made my last round to see that all the injured were asleep, not a man murmured. A destroyer with three hundred and fifty passengers aboard in heavy weather is not the most comfortable ship in the Navy, but as I curled up alongside the other sailors on the deck, around one of the warm stacks, it was the closest to heaven I had ever been.

"And that was how we ultimately came to Perth. . . ."

Hero tales? Not a bit of it. Glimpses of the day's work. The kind of thing that may happen to any Navy doctor during a naval battle. The kind of thing that *is* happening.

CHAPTER III

# Gold Oak Leaves and Silver Acorns

THERE'S A LOOK in every skipper's eye as he sizes up his new medical officer that is usually compounded of one part pessimism, one part wariness, and one part hope.

The hope is of the incurable nautical variety, endemic among sailors. It is what keeps them going in all weathers and in the face of innumerable misadventures. Undoubtedly it is the quality which made old-time philosophers select a ship's anchor as a symbol of hope. It also—as Navy doctors have reason to know—gets its possessors into innumerable difficulties ashore. But those stories come later.

That look in the skipper's eye reveals that, in spite of all previous experience, he is still looking for the perfect ship's surgeon. When he was a boy he probably read *Treasure Island,* and he has never forgotten the immortal and invaluable Dr. Livesey.

At Annapolis, his attention was called to the exploits of Sir Francis Drake, through which he made acquaintance with doughty James Wood, of the *Garland,* chief surgeon of El Draque's fleet, who succumbed to the same epidemic of yellow fever on the day before it killed the mighty mariner whom Spain could not defeat. And to Captain Cook and the useful Mr. Anderson, chief surgeon of the expedition, whose understanding of the psychology of seamen inspired him to limit the ship's supply of sauerkraut to the officers' mess. With the inevitable result, the crew demanded a daily ration from the barrel, ate it defiantly, and so made a voyage, lasting over three years, without a single case of scurvy.

It's a man of that heroic stamp he is looking for.

Through a good many years, and on a good many cruises, under a good many skippers of varying temperaments, I have given a lot of thought to a consideration of what an officer of the Line expects of an officer of the Medical Corps. I have come to the conclusion that what most of them dream of—and stubbornly go on hoping to discover someday—is a M. O. who exhibits a combination of all the virtues of the most famous ships' surgeons in history and romantic fiction plus the qualities which Dumas' *Three Musketeers* sought in their valets—always on hand and ready to fight for and beside them; one whose ear is always alert to catch the rumbling of any approaching disaster; whom nothing that can happen to men's bodies, to their minds, or even to their souls, can dismay.

Line and Staff—these are the Navy. The Line is the backbone of the service. It is composed of the graduates of Annapolis and a selected few who have been commissioned from the warrant officers, who command the ships and the enlisted men who man them. Officers of the Line are marked by a star on their coat sleeves above the rows of gold braid which denote their rank. To sustain the Line, there are a number of Staff Corps, which are grouped under special departments: The Department of Yards and Docks, the members of which are the architects, construction engineers and builders; the Department of Supply, charged with the job of outfitting ships and naval stations; the Department of Ordnance; the Chaplain Corps, and the Medical Department.

The Medical Department's central administrative organization is the Bureau of Medicine and Surgery, whose chief is the surgeon general, with the rank of rear admiral. The surgeon general is appointed directly by the President for a term of four years.

Our present surgeon general, Rear Admiral Ross T. McIntire, is a physician of outstanding ability. Under his leadership, the Bureau of Medicine and Surgery has anticipated the demand and provided adequate personnel, supplies, and hospital facilities to meet the unprecedented expansion and the problems which this global war has thrust upon it.

Over the surgeon general, as over the chiefs of all of the seven bureaus of the United States Navy, is the Secretary of the Navy.

That, in brief, is the setup.

The Bureau of Medicine and Surgery is charged with and responsible for the maintenance of the health of the Navy, for the care of the sick and injured, for the custody and preservation of the records, accounts, and property under its cognizance and pertaining to its duty, and for the professional education and training of officers, nurses, and enlisted men of the Medical Department of the Navy.

It is charged with the upkeep and operation of all naval hospitals, medical supply depots, the naval medical and dental schools, and of all technical schools established for the education or training of members of the Medical Corps, Dental Corps, Nurse Corps, and Hospital Corps.

These four corps make up the principal divisions of the Navy's Medical Department.

Each corps has its own insignia. Officers of the Medical Corps—the Medical, Dental, and Nurse Corps are comprised of officers only—wear a spread oak leaf embroidered in gold, surcharged with a silver acorn. The oak is traditionally sacred to the Druid priest-physicians. The Dental Corps wear the same leaf, but with two small silver acorns, one on each side of the stem. The Nurse Corps wear the insigne of the Medical Corps superimposed on a gold anchor. The Hospital Corps comprises the enlisted personnel of the Navy's Medical Department, who wear the red Geneva cross, plus a small number of commissioned and warrant officers, who wear the gold caduceus. The caduceus is the wing-tipped staff twined with two serpents, and was the ancient symbol of Mercury, the Greek god of healing. These insignia are reproduced on the dedication page.

The naval medical officer not only is responsible for the health of the personnel of the Navy, but he is also the medical officer for the Marine Corps. The Marine Corps is an integral part of the Navy and functions under the Secretary of the Navy, although it has its own commandant, with the rank of lieutenant general.

This brings the medical officer into all landing parties, temporary occupation of ports until the Army takes over, and into large military campaigns. During World War I many of our medical officers won great honors and distinction while serving with the Marines in France, particularly in Belleau Wood and at Château-Thierry. I served with the Marine Guard at Peking, China, for a period of about three years, and also in the Philippines, and have never experienced a more pleasant, varied, and interesting duty.

The recent addition of the Waves to the Navy has provided a group of women who are rendering excellent service. There are a number of commissioned officers, as well as those holding enlisted ratings. The commissioned doctors are on duty where there are other Waves stationed, and also in large hospitals, particularly in the technical departments. They serve to release for sea duty members of the regular Navy.

Though a Bureau of Medicine and Surgery was established by Act of Congress only on August 31, 1842, there have been ships' surgeons in the United States Navy since the first ship was commissioned. This was the *Alfred,* whose first lieutenant, John Paul Jones, hoisted the Star and Rattlesnake flag to her masthead in the harbor of Philadelphia in 1775. Aboard the U.S.S. *Alfred,* to fight the British in the Atlantic, sailed the first American Navy doctor—Joseph Harrison, M.D.

An act of the Continental Congress of that same year, which ordered the formation of a naval force, allotted "a surgeon and a surgeon's mate to each vessel." The surgeon's pay was approximately twenty-five dollars a month.

Some of those early ships' surgeons were doughty fellows. They had to be, to stand the seafaring life of those days. Wasn't it old

Samuel Johnson who remarked to a friend about to take a voyage, "Why go to sea when there are prisons ashore?" Those wooden ships, with their bilges filled with black, stinking water, the crowded quarters, poor facilities for carrying and keeping foods, and the necessarily long voyages, were pestholes to rival the Black Hole of Calcutta.

In those days, the expression "Scurvy as a sailor" was not undeserved. During the great years of the East India Company's trade, the ships that sailed from England to Calcutta regularly lost one third of their crews from this disease on every voyage. Aside from seasickness, scurvy is the one disease which may be said to be almost purely nautical. It occurs on land, of course, among the malnourished; but at the time of the great naval expansion during the sixteenth century, scurvy was comparatively rare, except among seafarers.

Scurvy, as we know now, is one of the deficiency diseases. It results from a diet too low, or entirely lacking, in vitamin C. As the human body is unable to store up any great reserve of this vitamin, a marked reduction in its amount in the diet is soon followed by symptoms of scurvy. Take away from the diet all fresh meats, milk, fruits, and leafy vegetables, and, within as short a time as two weeks, early symptoms of scurvy may appear. Exposure to cold and wet, fatigue, and loss of sleep hasten the onset of the disease.

Given these conditions—and these were the conditions that obtained in all navies in the days of wooden ships and canvas—scurvy was as common aboard ship as rats and cockroaches. Sir John Hawkins, Queen Elizabeth's great captain, says that in his twenty years at sea scurvy cost the British Navy 20,000 men. The disease played less havoc with Spanish, Portuguese, and Venetian sailors than with the British, perhaps because the ships that were outfitted at Mediterranean ports usually carried more of the antiscorbutic citrus fruits, cabbage, and onions.

My friend, Captain Louis H. Roddis (MC), United States Navy, in his *Short History of Nautical Medicine,* to which I am indebted for many of these historical facts, tells the story of a Portuguese sailor serving on one of the ships in the East Indies trade who "came to 'request mast' and asked that an onion be added to the bread, oil, cheese, and wine that formed their main ration." The captain roared out at him to demand if he expected luxuries at sea. Yet just that additional onion a day would have saved lives from scurvy.

The disease seems to have been less prevalent on the Dutch merchantmen and naval vessels than on those of other Northern navies. This may be due to the fact that Dutch ships usually carried a hogshead of sauerkraut which was served to the mess.

As Captain Roddis points out, "Many wars and campaigns have been decided more by disease than by arms." Medical writers of the early nineteenth century agree that England's blockade of France, which ultimately annihilated Napoleon's sea power, would have been impossible if scurvy had not been previously eliminated from the British Navy.

Yellow fever and malaria destroyed the power of Drake's fleet off South America and left the Dons in power.

What cost France the loss of her empire in the Caribbean was not the strength of the Haitian rebels, but the "yellow jack," which routed Rochambeau's army.

One of the greatest names in the history of naval medicine is that of James Lind, who served as surgeon on board H.M.S. *Salisbury* in 1747. Lind experimented with twelve cases of scurvy aboard that ship, until he proved conclusively that the disease could be cured, and very rapidly, simply by adding lemon juice to the daily ration. In six days two sailors who had been given a lemon and two oranges daily during the experiment were so far recovered of the disease that one man went back to duty and the other was retained to nurse the remaining ten who had been kept without the ration of vitamin C. Dr. Lind's cure for scurvy was adopted by ships' surgeons in the British and other navies. But it was not until nearly fifty years later that Sir Gilbert Blane, fleet surgeon on Admiral Rodney's flagship, H.M.S. *Formidable,* who had followed Lind's treatment for scurvy with the result that not one of the nine hundred men aboard the *Formidable* was lost from scurvy in six months, succeeded in having the Admiralty make lemon juice a requirement for all vessels of the Royal Navy.

With the introduction of a daily ration of lemon juice, to begin after a ship had been at sea for a fortnight, scurvy disappeared from the British Navy as if by magic. At that time there was little distinction made between lemons and limes. In fact, lime juice was often substituted for lemon juice in the ration. This is the origin of the term "limey," used for a British sailor to this day.

In view of what we now know about vitamin C, it is interesting that the quantity of orange or lemon juice recommended by Dr. Blane—one ounce daily—contains almost the exact amount of ascorbic acid which modern scientific studies have shown is required to maintain the vitamin C balance of the body.

If James Lind and Sir Gilbert Blane lead off the roster of famous naval surgeons, the next names in the list are those of Charles Darwin, Thomas Huxley, Karl von Linné, better known as Linnaeus, the great Swedish botanist, and the English botanist, Sir John Richardson.

Among the famous doctors of the American Navy must be mentioned Dr. Edward Cutbush, of Philadelphia. While still a medical student at Pennsylvania Hospital, he served in the fight against the yellow-fever epidemic of 1793 and received the official thanks of the city of Philadelphia. Upon graduation, he joined a force of militia to suppress the Whisky Rebellion. Later he was appointed "surgeon in the Navy of the United States." He served on the *Constellation* in the blockade of the Barbary ports. This squadron was based at Syracuse, Sicily, where Dr. Cutbush established what was probably the first United States naval hospital, certainly the first one overseas.

Cutbush was probably the first surgeon in our Navy to vaccinate against smallpox. In 1799, only one year after the publication of Jenner's historic treatise, Cutbush vaccinated all those aboard the frigate *United States* who had not had smallpox. In 1808, at the time of an outbreak of smallpox at the Marine barracks, Philadelphia, the doctor wrote to the Secretary of the Navy, "The natural smallpox has now appeared among the recruits; to arrest its progress, I have vaccinated thirteen." The official order from the Navy Department, making smallpox vaccination compulsory, did not come until December 1, 1848.

Cutbush's extraordinary energy carried him on to write the first book on naval medicine by an American: a work whose sound common sense and practical suggestions on the subject of food, clothing, water, personal hygiene, disease prevention, recruiting, and the organization and administration of military hospitals have not been surpassed by any writers on the subject since his time.

Dr. Usher Parsons, who was Commodore Perry's surgeon at the Battle of Lake Erie, was the only surgeon in the squadron able to attend the sick and take charge of the wounded. The other medical officers with the naval force were ill with what was called "lay fever"—probably malaria. Parsons tells us, "Having sole charge of the wounded of the whole Fleet, and the wounded being passed down to me for aid faster than I could attend to them in a proper manner, I aimed only to save life during the action by tying arteries or applying tourniquets to prevent fatal hemorrhage, and sometimes applying splints as a temporary support to shattered limbs, et cetera. In this state the patients remained until the following morning, under the free use of cordials and anodynes. At sunrise [the eleventh] I began amputations, and in the course of the whole day I visited the other vessels and brought all the wounded on board the *Lawrence* and treated them in like manner."

After 1820 Parsons resigned from the service and became a civilian physician in Providence, Rhode Island. He was a leader in the medical profession in that state and Professor of Anatomy and Surgery at Brown University. One of Dr. Parsons' greatest services while in the Navy was his effort to bring about the abolishment of flogging as a mode of discipline.

Captain David Porter's account of his voyage in the U.S. frigate *Essex* around Cape Horn and into the Pacific makes frequent mention of the three medical officers with him. The names of Surgeon Robert Miller and Surgeons Mates Alexander M. Montgomery and Richard K. Hoffman were signed to the Declaration of November 19, 1813, in which Porter took formal possession of Madison Island for the United States. This was our first island possession in the Pacific.

Not even a brief sketch of the history of the United States Naval Medical Corps would be complete without the story of Dr. Lewis Heermann, who was surgeon of the *Enterprise*—Decatur's ship. At the time the Bey of Tripoli was making trouble for American merchantmen, a squadron of observation sailed from Hampton Roads with orders to visit the North African ports. While the blockade of these ports was maintained, American ships used to put in at Malta, Gibraltar, Malaga, and Port Mahon on the Island of Minorca, to take on supplies, make repairs, or land sick and injured. We had temporary naval hospitals on Minorca, the record of which has vanished except in the old American sea chantey:

*Off Cape de Gatte*
*I lost my hat,*
*And where do you think I found it?*
*In Port Mahon*
*Under a stone,*
*With all the girls around it.*

During the war, the frigate *Philadelphia* was captured by the enemy and its officers and men held prisoners for nineteen months. One of the *Philadelphia's* medical officers, Dr. Jonathan Cowdery, became a favorite of the bashaw and was called in by him as obstetrician at the delivery of one of his favorite concubines.

As soon as the news of the capture of the *Philadelphia* became known, plans were made by Commodore Preble to destroy her before the Tripolitans could complete her salvage. The Americans had captured a small lateen-sailed ketch, sailing to Constantinople with the bey's present to the sultan of a cargo of female slaves. This vessel was renamed the *Intrepid,* under command of Stephen Decatur, and manned by a crew of volunteers. She looked like any one of the ordinary Mediterranean craft commonly seen along the coast of Algiers and Tripoli. Decatur's orders were to sail her into the harbor of Tripoli and up alongside the *Philadelphia.* The crew was to board the *Philadelphia,* drive the Tripolitan prize crew overboard or below, set the frigate afire, and then cast off from the burning vessel and row out of the harbor away from the fire of the bey's forts and men-of-war. It was a bold plan, and executed as boldly. Lord Nelson, no bad judge of naval exploit, called it the most daring act of the age.

Now we come to Dr. Heermann, the surgeon aboard the ***Enterprise.*** Lieutenant Decatur told the doctor: "The brig ***Siren*** will accompany us to give succor if required, and to cover our retreat if necessary. I shall want you, Doctor, to go with me. But before I go into the harbor, I shall put you on board the brig."

Dr. Heermann begged for permission to remain on the ketch—an idea which Lieutenant Decatur discouraged, saying: "The expedition is too dangerous to expose surgeons. Suppose, sir, you should be killed or wounded it would reflect on me." But the doctor persevered: "My life, sir, is not more valuable than that of any of the other brave officers and men who are to accompany you. Should I be killed or wounded, the officers and crew would be as well provided for after their achievement by Dr. Marshall alone as by him and myself united." He went on to urge the lieutenant with the argument: "The presence of a professional man to assist the wounded might save you many valuable lives that may be sacrificed from loss of blood for want of a surgeon conversant with the most effectual means of stanching it. And will not sailors more regardlessly expose themselves when they know that professional aid is near at hand? Should you have many wounded, would not some confusion arise to impair your effective force?"

In all the literature of the sea I do not believe there is a more eloquent argument for the presence of the Navy surgeon than these words.

Decatur yielded to them. When the time came to board the *Philadelphia,* he put the command of the ketch under the doctor, with seven seamen. His warning was: "The enemy, when pressed hard, will be apt to retreat from the spar deck and board the ketch from the ports of the frigate. As boats may be sent from shore to their assistance, your safety will consist in giving no quarter. I shall expect you to defend the ketch to the last man, as the successful issue of the expedition may depend on its preservation."

Heermann played his part well, and the success of the exploit in which he figured has passed into American naval history.

The United States Marines have a song for it:

*From the Halls of Montezuma*
*To the shores of Tripoli . . .*

On those same shores of Tripoli and Tunis, United States naval doctors have carried on the tradition established by Dr. Heermann: landing by parachute with paratroopers; serving aboard submarines and the destroyers and cruisers convoying armed land forces to our campaign in North Africa, and establishing laboratories for the investigation and ultimate elimination of diseases like typhus, dysentery, and cholera, which, so far, have always followed in the wake of war.

In the past seventy-five years medicine has progressed from an art to a science. The doctor today has diagnostic aids which would have seemed fabulous to the physician of a hundred years ago. Exact laboratory tests and the X ray enable the physician to base his treatment on definite knowledge. These are as available to the surgeon and doctor aboard ship as to the man working in the most modern and extensive medical center.

Take a look, for example, at the sick bay aboard the U.S.S. *Brooklyn*. Here is a typical doctor's office with its desk, medical library, and lockers for medicines and instruments. The bulkheads are scraped bare of paint to meet battle conditions. It has been found that in battle, when the ship's ventilating system is shut off and all hatches are closed, the paint tends to heat and may become a fire hazard.

Next to the medical officer's office is a completely equipped operating room with its table under shadow-proof lights and every surgical instrument you would find in the best hospitals ashore. Off this is the sterilizing room with its stainless-steel equipment. There is also a small but adequate pharmacy and laboratory, where members of the Hospital Corps put up prescriptions, make blood and urine analyses, and do all the technical work required by modern surgery and medicine.

Along the passageway is the office of the ship's dental officer, whose X-ray machine serves medical officers also.

Across the passageway is the cruiser's hospital, or sick bay, with beds for twenty-five patients. The complement of a cruiser is about 1,200 men, so the hospital facilities more than equal those of the most progressive civilian communities. The medical staff of a cruiser usually consists of a chief medical officer, together with an assistant and a dental officer. Under these officers are several pharmacist's mates, trained as anesthetists, laboratory technicians, bacteriologists, and chemists, who give advanced first aid and care for the injured and sick.

Many doctors come into the Navy from civil practice, as Medical Reserve officers for the duration of the war, and wonder at first how they are going to carry on without women nurses, and in the small confines of a fighting ship. The first discovery they all make —and admit with a simplicity that is quite touching to a doctor of the regular Navy—is that the hospital corpsmen, some of whom are lads less than twenty years old, who were students, plumbers, shoe clerks, morticians' helpers, and welders before they enlisted, make most efficient, dependable, and loyal nurses.

The second discovery they make is that they can treat the infinite variety of ailments and injuries which come to a sick bay with the limited but expertly selected pharmacopoeia a ship carries. This may call for a more inventive and exact knowledge of drugs and chemistry than many of these physicians required in civilian life, when they had offered for their use innumerable preparations put out by all the drug manufacturers in the country.

The Navy's Medical Corps is made up of physicians who are graduates of recognized medical schools. For appointment, they must be citizens of the United States and less than thirty-two years of age. The number of medical officers in the Navy, as prescribed by law, is six and one half per thousand of the total authorized strength of the Navy and Marine Corps.

Applicants for the Navy Medical Corps are selected after careful physical and professional examinations. Those selected are then sent to the Navy Medical School, which is now located at the National Naval Medical Center, a few miles outside of Washington, at Bethesda, Maryland. There the "boot" doctor is inoculated with Navy training, regulations, and tradition. He also brushes up on phases of medical work and surgery which may be more prevalent in the Navy than in civil life. For example, today very few doctors in general practice, or young internists, have had a chance to study at firsthand cholera, bubonic plague, yellow fever, dengue, dysentery, or typhus. Few of them have seen advanced cases of malaria. The Navy doctor, who may be sent to service in the Solomons, in Panama, or with the fleets in either ocean, will have need of knowledge of these tropical diseases. This we try to give him at the Navy Medical School before he reports for active duty.

The school also serves as a consultant center for the entire naval service. Medical officers from all parts of the world send pathological specimens there for diagnostic study and confirmation.

In addition to the regular officers of the Medical Corps we have the Reserve officers—physicians in civilian practice who may be called into the Navy's service during an emergency. These Reserve officers serve in naval hospitals ashore and aboard the fighting ships under exactly the same conditions and regulations as regular Medical Corps officers. They include many of the outstanding men in the various fields of surgery, medicine, epidemiology, psychiatry, and research. Because of their age a number of these doctors did not have to join the armed forces, but they have unhesitatingly and voluntarily given up lucrative practices and the comforts of home to render what service they can for the alleviation of the sick and wounded soldiers, sailors, and Marines.

While this book was in process of writing, the lady who has assisted me with the material and its arrangement saw a young sailor sitting patiently on a bench in Grand Central Station. When she spotted the red Geneva cross on his left sleeve, which marked him as a member of the Navy's Hospital Corps, she went over and sat beside him in quest of copy.

It was hard digging. The boy had been well drilled in the necessity for withholding all information that might be of use to the enemy. Finally, in desperation, the interviewer gave as her excuse for asking questions the preparation of this book.

The boy took a long, sharp look at her. Then he blurted out: "Even if it gets to Hitler, I'll tell you this—the Navy's got the best damn doctors in the world."

Then, swinging his duffel bag over his shoulder, he took refuge in flight.

## CHAPTER IV

# Sea Duty

I'VE OFTEN been asked by interested, if not very well-informed, civilians—and not infrequently with a supercilious look—"What does a Navy doctor find to do aboard ship in peacetime?"

The answer is: plenty.

Even though his patients are all male, and practically all of them young, every kind of case comes to the sick bay in the course of a single cruise. We have a saying in the Medical Corps: "In the Navy you may get anything from harelip to twins." Perhaps this isn't such an exaggeration now, since we have the Waves.

Aboard ship, the chief medical officer is much more than a ship's surgeon. He is depended upon for adequate treatment of the sick and wounded, and his advice and recommendations for promoting the health and well-being of the men are sought by the Line officers. He is also a part of the ship's military organization, one of the members of the fighting team.

Sick call is sounded every morning about eight o'clock. This is the medical officer's morning office hours, when patients present themselves at the sick bay for examination and treatment. There is a second sick call in the evening. During the day and at night the doctor is on call for accidents or any emergency that may occur.

A modern battleship is perhaps the highest type of concentrated mobile power developed by the mind of man. It is a mass of machinery, controlled by steam and electricity which must be operated by man. On the most peaceful cruise in friendly waters, the ship's crew are liable to all the wide variety of accidents that happen to men employed in big industrial plants. Steam pipes burst, and men working near them are scalded by the escaping steam. The ship lurches suddenly, and a steward carrying a heavy tray misses his footing on the steel ladder, falls, and limps to the sick bay with a sprained ankle and an assortment of bruises. You have a long run of foul weather, and a dozen seamen develop colds that have to be treated and watched if you don't want to find yourself with several cases of pneumonia on your hands.

Officers and men are engaged in hazardous occupations at all times—in peace as in war, and night and day. They have to handle boats in bad weather, work around the machinery, engine, and firerooms, drill with guns and turrets, handle ammunition, operate aircraft and submarines, and perform a thousand-and-one things which go to make up daily life at sea. At any moment you may get a man brought in for surgical treatment whose arm has been mangled in a baking machine, a case of fracture caused by a fall from a mast or down a hatch, or one with foreign bodies in the eye. Most of these, naturally, occur during storms, when the ship is pitching and rolling. On a large battleship with 1,500 officers and men, two doctors and a dentist share the general practice. The medical officers are sufficiently busy. Twenty thousand patients were treated in the sick bay of one such ship, 10,000 prescriptions dispensed, and 4,500 dental treatments given in a year.

Most of the lads in the forecastle are young. They are husky and sound, as the searching physical examinations they have been put through at recruiting stations and boot camps have proved. But there is no insurance against sudden cases of appendicitis. As a matter of record, there is scarcely a cruise that you don't have at least one appendectomy to perform at sea. You are lucky when the case is brought to you in its initial stages, before the appendix has ruptured. One of the gravest problems facing medical officers aboard fighting ships just now is the men's unwillingness to admit they are sick and need hospitalization. They don't want to risk missing any of the fight. On one of the cruisers which has been on duty with the Atlantic convoys, a seaman fainted one day on deck. He was taken to the sick bay for examination, which revealed a ruptured appendix and evidences of peritonitis.

"But you must have suffered considerable pain for some time before you fainted," the medical officer remarked. "Why didn't you report at sick call this morning?"

"Hell, sir, I couldn't be bothered," was the reply.

No small part of the responsibility of the ship's medical officers, and the hospital corpsmen under them, is to see that all cases do answer sick call; that even minor accidents are reported promptly, and any suspicious skin infections and colds are brought in for examination and treatment.

The chief medical officer of one of our ships on the Atlantic, while the ship was operating off the African coast, was called one afternoon by a seaman who appeared in the door of the sick bay with his eyes standing out of his head like apples.

"Doctor," he gasped, "there's a guy lying out here bleeding to death in his own guts!"

What had happened was that a sailor had slipped, fallen, been tossed by the roll of the ship and brought up against a bulkhead where the garbage cans were. He lay there, bleeding profusely, covered with potato peelings.

Even in war youngsters, when they get together off duty, play tricks on each other and have a tendency to roughhouse. Occasionally accidents happen, as these do among the undergraduates of any college. On one of the cruisers escorting military transports to northern Ireland, a lad was showing off by chinning himself on the pipes in the compartment. He lost hold and fell, injuring himself painfully. He was promptly examined, and it was found he had ruptured his spleen. The convoy was moving through bad weather and moving fast to keep away from enemy submarines and planes. It was impossible to slow down the ship, and the senior medical officer, an experienced surgeon, decided it was too dangerous to attempt to operate on the boy under those conditions and at that time.

He was bandaged and kept in bed until the convoy reached its destination. Then he was taken off by a British ship and sent to a British naval hospital for the operation. On the cruiser's next trip the sailor was picked up and brought home to finish his convalescence in a naval hospital in the United States.

Sailors show as many varieties of temperament as any other group of men. There are tough customers whose constitutions seem impervious to any injury. Such was the oiler who finally presented himself at sick bay and asked for a cure for chronic constipation.

"How is your appetite?" asked the medical officer.

"Oh, I don't let it affect my eating none," the man assured him.

"Well," said the doctor, "my advice to you is to go on eating plenty of food. In due course of nature you're bound to defecate or bust!"

"That's what I thought myself, Doctor," the sailor agreed.

Then there are the anxious natures, like the apprentice seaman, second class, who recited to the doctor a long list of symptoms, concluding with morning sickness and an inordinate desire for certain foods. "What do you think can be the matter with me, Doctor?" he inquired.

"If you hadn't been examined at the recruiting office and found a male, I'd say you had a slight touch of pregnancy," was the doctor's dry comment. "Are you married?"

"Not exactly, sir," was the reply. "But I've got a girl friend in Brooklyn."

Every ship's crew has its quota of gold-brickers who try to work the doctor for a sick badge which automatically lets them off duty as long as they wear it. There is a continual contest between their ingenuity in devising symptoms and your skill in detecting it. Eventually you acquire a nose for malingerers and invent ways of dealing with them or, better still, of letting their shipmates deal with them.

A man in the black gang came several times to the sick bay, complaining of heat exhaustion. Heat exhaustion is something our engine-room gangs used to suffer from a great deal. However, the discovery that the exhaustion was due to loss of salt from the body from sweat and that supplying salt tablets at the drinking fountains used by the men would make up this loss has made cases of heat prostration rarer in the Navy than in industry ashore.

There was no real reason why this particular oiler, who drank the salted water, should be overcome. It was clear that he was looking for a way of loafing. The medical officer gave orders that he would have to be acclimatized gradually to the heat of the engine room. He ordered him to sit there during his watch without working. It was extraordinary how soon the man reported himself recovered of his weakness and able to carry on with the rest of the gang.

The young medical officer usually has a tendency to transfer more cases than necessary to the hospital ship, or to naval hospitals ashore. He brings with him from civil life ideas of absolute quiet, "milk diets," and the need for a large, inexhaustible, and varied supply of drugs. However, as he becomes accustomed to naval life, he also becomes accustomed to the use of a small but carefully selected collection of medicines. His "milk diet" consists of evaporated milk from cans, or milk soups. He discovers that noise does not seem to have much effect on the bluejacket. A convalescent from appendicitis will sleep through the firing of a salvo of twelve-inch guns from the deck over him and not show a rise in temperature of even one tenth of a degree.

Suppose we follow the Navy doctor on some of his duties outside the sick bay. One of the first of these is to see that the ship's galleys and the quarters of the crew are clean at all times. This brings me to a story which occurred aboard one of our battleships.

The ship had been in yard overhaul for many months and as a result had become infested with cockroaches. The senior medical officer was very much perturbed over this insanitary condition. He organized a spray-gun squad which made war on the roaches in all the galleys and pantries every night after the lights had been put out. Pressure was put on the cooks and stewards to keep the food-cooking and food-storage compartments clean. The skipper and the exec were loud in their praises of a job well done.

Then came a Saturday morning and captain's inspection. As they went through the ship, the doctor was proud of his part in the roach-prevention campaign. The inspection had progressed to the captain's own little galley. Everything was immaculately clean. The Filipino steward was standing at attention in a corner, resplendent in his starched white uniform. At that moment the grandfather of all cockroaches, an enormous and perfect specimen, ambled out from under the range and started a leisurely walk across the spotless white-tile deck. The captain looked reproachfully at the doctor, then at the steward, and pointed an accusing finger at the roach. The steward bent down and scrutinized the insect. Then he announced with dignity, "Yes, Captain, I see him, but he is not mine. He is merely passing through on inspection."

Navy regulations for supply officers are precise in decreeing inspection of all foods. All fresh provisions procured for use in the commissary department are required to be inspected by the commissary officer to determine whether the articles delivered conform to the requirements. Meats are required, by Navy regulations, to be passed by an inspector of the Bureau of Animal Industry, U.S. Department of Agriculture, and must show his blue stamp of approval. The Navy is particular about the sex of animals from which the meat comes. No meat from bulls, boars, stags, or cows is acceptable. Naturally, this regulation in favor of castrated animals provides a lot of jokes, but it also ensures the men aboard ship and in training camps prime meat.

As a matter of fact, the men in our Navy are the best-fed body of men anywhere in the world. The Navy ration, as laid down by

Act of Congress, gives the sailor—if he eats it all—fully 4,000 calories a day. The foods served at all messes aboard ship include all fresh vegetables and fruits, Grade-A milk and dairy products, and only the best meats. A cruiser, which has a complement of about 1,200 men, carries in her food-storage compartment sufficient foods to feed all messes fresh vegetables and fruits, fresh meat and dairy supplies for six weeks at a time. Using emergency rations, she can stay out at sea for three months without revictualing.

The food-storage compartments, refrigerators, the butcher shop, bakeshop, and the galleys all come under the doctor's jurisdiction as the ship's public-health officer. He inspects them from time to time and issues orders relative to keeping these and the heads (toilets) clean. The master-at-arms, who is the ship's chief of police, sees that these orders are carried out.

The orders go into careful housekeeping details. No meat may be chopped and set aside to be cooked and served the next day. Chopped meat may not be kept in the refrigerators in containers deeper than three inches. Hash and ham seem to be two foods which cause a great deal of food poisoning. Therefore, the Navy rules that boiled ham should be served hot. If it is intended to be served cold, it must be placed in the chill box shortly after boiling and kept there until time for it be served to the men. Cream puffs and chocolate éclairs are taboo in the tropics.

Fighting on this front, the medical officers teach the mess cooks and food handlers to watch carefully for spoiled food, some of which can be detected by its appearance and smell. Cans of food which are dented or show bulges or nail holes must be discarded. All meats must be thawed in the chill box. Dish towels must be sterilized and dried on deck in the sun and air.

Few home kitchens are as spotless and sanitary as a ship's galley. It is not unusual to find that the master-at-arms has stationed a guard by the dishwashing machine to see that the water used in it is of the high temperature required by Navy regulations.

Red tape? Not a bit of it! Just preventive housekeeping, which is one step in the Navy's great campaign of preventive medicine.

Aboard ship every man of the crew is needed all of the time. If half a dozen of them are on the sick list due to food poisoning or some other illness resulting from neglect and insanitary living conditions, their work must be divided among the other men.

The Medical Department of the Navy is officially pledged: "To keep as many men at as many guns as many days as possible."

In addition to the three messes a day which are now served cafeteria style on all ships, and at which a man can have as much of anything as he wants, each ship has its "gedunk" stand. This is the canteen where the men buy ice cream, soft drinks, candy, sweet cakes, cigarettes, et cetera. To their 4,000 daily calories of Navy ration the lads frequently add 6,000 calories from the gedunk stand. Considering the unholy combination of sweets they stuff themselves with, between watches, it is extraordinary there aren't more cases of illness than there are. At all times, and in all places in the ship, pots of Java are brewing. A seaman will stuff himself at the gedunk stand before going on watch, drink several cups of scalding-hot coffee, and at the end of his four hours' duty take another cup or two of coffee before turning in to his hammock, to sleep like a baby.

At Panama and in all the ports of Central America and the West Indies, the bumboats are a familiar and welcome sight. Tempting, indeed, are the pineapples, mangoes, and fresh coconuts which they carry. In the West Indies it used to be the custom for the bumboat men to drill holes in coconuts, empty out the milk, and fill the shells with good Haitian rum. Those coconuts were greatly in demand among sailors who had been in those waters before. They would drain the liquor from the nut in a long pull. "Sucking the monkey," we called it. Every junior Line officer has gone through the experience of suddenly finding some of his men, who seemed to have been innocently enjoying a few drinks of coconut milk, staggering around about the deck, dead drunk!

To any writer of mystery stories in search of a good opening for a tale I recommend what happened aboard the U.S.S. *Spica* during three days in December a year ago.

One morning a gunner's mate was telephoning on the forecastle. Suddenly those around him saw him sway, as though overcome by dizziness. Then he fell forward on his face in a dead faint. One of the ship's hospital corpsmen came, administered first aid, and, when the man regained consciousness, helped him down to the sick bay.

The gunner's mate was a healthy lad, aged twenty-two, who had an excellent health record. The doctor's examination disclosed nothing to cause him to have an attack of vertigo and no injury except a bruise over his right eye resulting from his fall. He could not remember ever having fainted before. Presently he developed all the symptoms associated with shock—pallor, a rapid, feeble pulse, low blood pressure, and a cold, clammy skin.

The *Spica's* medical officer put him in the hospital under observation.

Next day a fireman on watch in the fireroom exhibited the same symptoms. He, too, fell forward in a faint, bruising his face considerably. He was carried to the sick bay, where it was discovered he had the same shock symptoms as the gunner's mate. He, too, was hospitalized.

Meanwhile, an undercurrent of horror ran through the U.S.S. *Spica*. What was this mysterious malady which had struck the ship? It lacked two days of Christmas which, even in wartime, is always a season for some festivity aboard ship. And here were two members of the crew struck down by an illness the doctor could not diagnose. The question each man asked his mates was: Who will get it next?

The doctor ordered an examination of the patients' stools for occult blood. The test was positive. It was clear, therefore, that both men had suffered a hemorrhage of the intestinal tract.

Three days later, after the Christmas dinners had been cooked and eaten, a ship's cook while on duty in the galley suddenly became dizzy and weak, broke out in a profuse perspiration, and began to vomit a quantity of red blood. In all, he vomited about two cupfuls. Examination revealed the signs of acute circulatory collapse, as in the other cases.

Here the cause was quite evident—namely, hemorrhage.

Next day a fourth man answered morning sick call, complaining of dizzy spells, and was hospitalized with the others.

Meanwhile, the doctor and the ship's officers instituted a careful search for something that could get into the men's food and cause the hemorrhages. They found it—a faulty can opener which caused small, sharp-edged pieces of tin to fall into the food of an opened can. The U.S.S. *Spica* was running in a danger zone at the time, which meant all ports closed and the ship continuously darkened. This, undoubtedly, had made inspection of the food difficult. Meanwhile, the can opener was becoming more defective, causing larger bits of metal to drop into the food. The cook's symptoms were the most severe, perhaps because he was sampling the food as it was opened.

The remedy prescribed savors of Mother Goose. All hands were fed large quantities of thick oatmeal mush to gather up any bits of tin in the intestines. The drink with this was strong tea, for its astringent action.

But the remedy, plus a new can opener, cured the crew, and the mystery of the U.S.S. *Spica* was solved.

When food supplies are taken aboard ship in a foreign port, the ship's medical officer inspects these in company with the supply officer. Certain foods from certain places are taboo. This taboo extends to certain fishes which are in the fishing grounds of the Puerto Rico and Virgin Islands' area. Though these are safely edible at some periods of the year, they would seem to be poisonous at other times. Among these temperamental sea foods are the barracudas, kingfishes, red snappers, and a fish called the horse-eyed jack. The way the natives of the islands ascertain whether the fish is fit to eat is by trying it on a duck. If the duck dies, the islander makes his dinner that day off plantains.

One of our Navy doctors stationed at St. Thomas, V.I., heard there had been recent cases of fish poisoning on Culebra Island. He visited the island and found that earlier in the week ten natives who were dining off a twenty-pound male barracuda were all ill with symptoms of nausea, vomiting, and diarrhea. Cats, who had eaten of the same fish, died. Immediately warning was broadcast by means of the *Fleet News Letter,* a mimeographed sheet circulated to all ships' officers in the Fleet, not to buy any fish while in the Puerto Rico and Virgin Islands' area.

Every medical officer has an opportunity for a life of varied adventure during his service aboard ship, if he has a taste for adventure. Of course there are doctors whose interest is narrowed down to their strictly professional duties. In consequence, these men live a narrow and lonesome life aboard the smaller ships, where the personnel is limited. I have known medical officers so bored that when the ship put in to foreign ports where these men had never been before, they had not sufficient interest to go ashore. Once when the U.S.S. *Illinois* was going through the Magellan Strait and most of us were spending our time on deck, looking at the awesomely rugged and magnificent scenery, I went down to the wardroom for something. There lay one of our senior officers, stretched out on the transom. He raised himself on one elbow and demanded with a yawn: "Well, what ocean are we in now?"

Some of us enter into the life of the ship, learn the rudiments of navigation, stand watch on gunboats, take boats out for sailing and rowing during the various drills, and become interested in target practice. In the beginning of modern gunnery in the Navy, between 1904 and 1910, target practice was not the perfected affair it is today. I used to be considered an excellent spotter on the

U.S.S. *Ohio,* and would sit in a boatswain's chair, rigged between the smokestacks, and call: "Up 500, right 1,000," and so on, down through a speaking tube, which consisted of a large hose, like the most experienced Line officer.

During the first years of my Navy service, back in March 1902, I accompanied a detachment of Marines to the Asiatic station. Part of my service at that time was aboard the gunboat *Frolic,* a beautiful ex-yacht of about 450 tons. She was small and she rolled considerably, but we loved her. We cruised in and around the maze of 3,000 islands that choke the sea between Luzon and Sulu, on a lookout for insurrectionists and carrying mail and supplies to isolated Army and Marine posts. During that time it was part of my job to pass on the fresh foods which we bought from the natives' bancas which would put out from shore at sight of us in hopes of selling fish, vegetables, and fruits. In those days the world had only recently been made aware of the cholera germ which may lurk fatally in an innocent-looking head of crisp lettuce. All the Spartan in my make-up was required to wave away the vegetable peddlers and their wares, and all the discipline vested in me as a naval officer was needed to keep the *Frolic's* officers and crew, tired of their "iron rations," from bargaining for death in the shape of fresh fruits and greens.

We were ordered to survey the harbor of Maibun Bay. This is on the southern coast of the island of Sulu. The sultan lived there, and his Moros were famed throughout the Pacific for their ferocity. We had several small brushes with them. They would tear down our signals as soon as we could get them up. We then resorted to driving pipes into the ground to enable us to find our position. The pipes were as promptly dug up. Turned into bolos, probably. I was the recorder of this survey, noting every sounding and the location given me by the two midshipmen who took the angles by instruments. Rather an unusual duty for a doctor, but interesting.

One day a few of us were ashore and the ship's carpenter was nailing the boards on a tripod signal. He had a pair of nippers which he used to bite off the ends of the nails. A group of husky Moros, clad in G strings and knives, stood by, fascinated by the nippers. Finally the carpenter passed the instrument to one of them and motioned him to try it. The native failed. The carpenter then took back the nippers, put it to his mouth, and pulled out a false tooth on a plate. He calmly passed this around the staring Moros and then, as nonchalantly, replaced it in his jaw. The natives looked on him as a miracle worker and gave us no more trouble after that.

One day a boat put out from shore and came up alongside the *Frolic*. The rowers called up to ask for the medico to come ashore. They made me understand that one of the sultan's soldiers had been shot the night before. These Moros had rifles and plenty of ammunition which they had smuggled in from near-by Borneo. When they weren't knifing at us, they would have a little scrap among themselves. I strapped on my revolver, took a couple of men, and went ashore. A guard was waiting for me on the beach and escorted me to a nipa shack. There I found a couple of Moros well armed, two or three women, and, on a pile of dirty mats, my patient. He had been shot through the arm and the chest and was in bad shape.

It was obvious that while the natives had sent for the white medico, they were suspicious of me and what I might do. To allay their suspicions, I unbuttoned my holster and laid the gun aside. I then gave the man a hypodermic, which caused him to twitch. There was a threatening movement and mutter in the group behind me. I imagined I could feel the prick of a bolo at the back of my neck.

I probably would have felt it if my patient had shown a bad reaction to the hypodermic and the surgery I had to do; but he was a husky savage, in spite of his filth, and stood the treatment successfully. I dressed the wound, gave instructions for his care, and left. Next day we sailed to another island and it was several days before we were back and I could go ashore to see my patient. I found him sitting in front of the shack, with his wives around him, looking hale and hearty. He was demanding, and getting, all the attention a man wants when he is convalescing.

Evidently he was a man of importance to the sultan, because His Highness sent me a number of pearls and a hatful of silver dollars.

At that time one of the most disastrous cholera epidemics that ever swept the Philippines was raging. The surgeon general of the United States Army reported 128,000 cases in Luzon, with 81,500 deaths among the Filipinos. The natives had no idea of sanitation, the water supply of Manila and other towns was primitive, and their superstitions led them to hide the dead. I inspected the old fort in Cavite daily with the captain of the yard, and we would constantly find bodies hidden in corners of the wall and behind heaps of rubbish. Of course we watched our men carefully, provided distilled water, never drank out of a glass in a public place, above all, never ate fresh fruit. It became a ritual always to burn the tip of a cigar before placing it in your mouth, and to burn the top of a soda-water bottle before drinking. The epidemic gradually spread southward among the islands, and I followed. At that time we had a small coaling station and a hospital on the island of Basilan, south of Zamboanga toward British Borneo. The island was garrisoned by 150 United States Marines. As in most of the Coral Sea islands, there was a fairly large Chinese population. The Chinese were the merchants. They maintained small stores where they sold fruits, nuts, mats, tobacco, et cetera.

I became quite chummy with one of them. On my afternoon strolls away from the hospital I would stop at his shop, buy a cigar and smoke it there with him while we talked. He had the wisdom, the shrewdness in appraising character, and the inimitable sense of humor that distinguish the Chinese among all the peoples of the Orient, and I valued his friendship. One night I was called by one of my men at the hospital who reported another death from cholera in the village. I got up and went with him to see the body. There lay my friend, dead from cholera. I had seen him, shaken hands with him, and smoked the cigar which he had handed me only about eight hours before.

CHAPTER V

# Keeping Them Flying

WHEN THE MAN IN THE STREET hears a heavy drone overhead, he is apt to think: "There's a man up there flying a plane." Not a pilot. His thought is more apt to run: "There's a fellow up there with 2,000 horsepower strapped to the seat of his pants."

This is the flier's recognition of the fact that aviation today has progressed to the point where mechanics is supreme over man. The problem is no longer limited to the design and manufacture of high-powered planes. The problem that confronts us today, in a war for air supremacy, is how to extend the powers and endurance of man to equal those of the planes he has invented.

How to meet this problem and find solutions for it is the job before the Navy's experts in aviation medicine.

We have been told repeatedly that this is an air war. The nation which can produce and man the greatest number of planes capable of flying at the highest altitude is destined to win. High-altitude flying is well advanced so far as the mechanics goes. We have planes capable of flying at 40,000 feet—roughly, eight miles up—but man as nature has designed him is capable of this only by means of special assistance. Man requires oxygen, and to date no one has discovered a substitute for this physical need.

As man mounts into regions where the supply of oxygen is less than his body demands, his circulation becomes affected. The red corpuscles in the blood must travel faster and faster to compensate for this deficiency. It is as though you had the problem of ferrying ten men per hour across a river with just two ferryboats to use for their transportation. Should you be faced by the necessity of getting twenty men across every hour, with the same two boats, you would obviously increase the speed of the two boats to accomplish this. Then comes the need for transporting forty men per hour. Now your boats have to work faster and faster to ferry the load. But there is a limit to the boats' speed. And that limit sets the limit on your transportation. Beyond it you cannot go. The same is true of the body's circulation at high altitudes, laboring under the effects of diminished oxygen.

The human body is capable of adjusting itself to an amazing number of new environments. It can adjust itself and carry on, for example, in the atmospheric changes up to an altitude of approximately 10,000 feet. That is, young, healthy, vigorous bodies can do this; others can't. Tests for fliers are carefully worked out to discover if the candidates are capable of these physical readjustments. Those whose examination proves that they cannot function well at high altitudes must be eliminated.

Above 10,000 feet the supply of oxygen becomes too scanty to sustain the human body properly. Therefore, ways must be devised for supplying oxygen mechanically to fliers in high altitudes. Before man can fly at high altitudes he has to have appliances which will supply him with oxygen and which will operate perfectly for long periods and in the exceedingly low temperatures of the upper strata. Suppose something happens to the plane in the air. The flier must resort to his parachute and jump. He may have to drop by parachute through 10,000 feet of cold air too rarefied to support life, in which case he must carry his oxygen with him in a small container which will not be affected by the leap into space. Oxygen apparatus must be impervious to the sub-zero temperatures of the upper atmosphere.

We have reached the point in the seesaw struggle for the supremacy of the air where we have engines capable of carrying men and bombs into the stratosphere. We have bomb sights so perfect that accurate placement is possible from great elevations. We have devices—and we are constantly improving on these—for supplying oxygen to men; and we have designed clothing which does much to protect those men from freezing in the phenomenal cold of the upper air. Unfortunately, the clothing is still bulky and not too effectual.

But in addition to man's need for oxygen and the necessity for keeping him from freezing to death at high altitudes are certain other requirements and limitations of the human body which continue to impose a limit on man's conquest of the air. The Frankenstein of man's creation can go where man—as yet—cannot accompany him. We have reached the point in aviation where man—the physiologic mechanism—is now the weak factor.

The nation which can devise means of extending the individual's powers and overcome this weakness will have supremacy of the air. Clearly, it devolves on medical science to do this. Therefore, I am not firing too long a shot when I say that the outcome of this war and the future complexion of our world depend, in large measure, on the efforts and achievements of the medical profession.

Aviation had its first real tryout during World War I. It was then still in the experimental stage. We knew very little about what high flying demanded of the human being. Therefore, our tests for fliers were inadequate. It was pretty much a case of letting anybody who wanted to fly, fly.

We were ignorant of flying stress—that is, what flying does to the human being's physical and nervous systems. We had no devices to protect pilots from carbon-monoxide poisoning coming from the motor exhaust, from anoxia at high altitudes, or from extreme cold, noise, vibration, and glare. There were no special provisions or trained personnel capable of detecting accumulative fatigue in a pilot, or the first warning signs of various neuroses associated with flying. This was revealed in crashes, casualties, inefficiency, and failures to qualify at the flying schools.

Out of this situation grew the first Special Care of the Flier Service, made up of medical officers who devoted their particular attention to a study of flying from the point of view of the man who went in for it. From this Special Care of the Flier Service evolved the specialty of Aviation Medicine, now recognized as a department, and doctors who specialize in this—flight surgeons, as we call them.

A flight surgeon is very much more than a specialist in aviation medicine. He is also a flier. In the Navy, his course of instruction includes two months of indoctrinal flight training, during which he engages in formation flying, blind flying, catapult shots, and torpedo runs. All are encouraged to solo. The object of this training is to fit the flight surgeon to understand from actual experience in the air just what the flier goes through and has to endure. After completing such training, and through living and flying with his pilots, he becomes understanding of them and the problems of the world in which they operate, and therefore capable of treating them.

A number of medical officers complete the course of aviation medicine—that is, the technical subjects relating to their specialty—but do not take actual flight training. These doctors are known as aviation medical examiners, not flight surgeons.

Sometimes a young, new pilot is cocky and inclined to show off, until he learns by experience that discretion is the better part of valor.

I recall the case of such a chap who insisted on taking a flight surgeon for a ride. They were flying a rather old plane that was none too safe anyway, so the pilot proceeded to pull off a few thrillers to see if he could affect the nerve of the flight surgeon. Finally he feigned a forced landing in a field about waist-high in weeds. As the wheels were clipping through the weeds, just clear of the ground, they struck an old barrel which the pilot had not seen. The impact bounced the plane about twenty feet in the air. The pilot immediately gave it the gun and climbed steadily to a safe altitude, then turned to the flight surgeon and asked him to see if the landing gear was still okay.

From the flight surgeon's seat in the rear cockpit he could see that the landing gear was quite all right, but he also realized that the pilot couldn't see the wheels from his seat due to the wing obstruction. Capitalizing on the situation, the flight surgeon pretended to the pilot that the wheels were folded up. This would mean a real forced landing and probably a ground loop over on their back. That, of course, means danger of fire. Well, the pilot was worried. He flew around and around, and finally got up nerve for the crack-up landing. Down he came for a slow stall. At the last moment he cut his switches for a dead-stick landing, to assure against fire. Naturally, since nothing was wrong, the plane landed perfectly, except, of course, it sat dead in the middle of the field until a service crew could come out and start the motor. The pilot was naturally confused but nevertheless had sense enough to look daggers at the flight surgeon, who gave him a broad grin. Finally the pilot smiled and modestly said, "I get you; a very neat lesson. Thanks; I won't forget it." And he didn't.

We have the highest standard in pilot selection of any nation in the world. The physical examinations used by our Army Air Service and that of the Navy are the most exacting known. We believe that it is better to find out as early as possible, and without wasting time, money, and effort, whether a man has the physical and psychological equipment that will make him a good flier. If he has not, he is better off in some other branch of the service. No amount of will or patriotic desire can make up for defects of vision, susceptibility to anoxia, or emotional instability.

Take some high-strung, ambitious chap who wants to be a pilot. If his temperament is one of moods which may make him self-absorbed and inattentive at times, he is a bad flying risk, even though he may be brilliant in his flying at times and a daredevil at taking chances. Many men have what appears to be normal visual function, but under the stress of flying fatigue and anoxia, latent defects of vision may appear. These men have to be weeded out. Many are capable of hard work and prolonged strain under normal atmospheric conditions but will develop defects of the cardiovascular system at high altitudes.

At the United States Naval Medical Center we are constantly at work devising tests which will reveal these tendencies in candidates as early in their training as possible. The National Research Council and many scientific institutions and individuals in the country are aiding this research. When an applicant is given the works—put through the initiation of the low-pressure chamber and apparently endless delicate eye tests—he is getting the results of twenty-five years of scientific research into what it takes to fly. Meanwhile, we are still carrying on investigations into the effects of anoxia on the human organism, and how the cardiorespiratory system functions at high altitudes.

Many students who pass the physical examination for flying have to be dropped from training because of airsickness. It was a flight surgeon, Lieutenant T. T. Flaherty (MC), United States Navy, who worked out a six-point program for dealing with this condition. Dr. Flaherty discovered that airsickness usually asserts itself while the student is learning the art of acrobatics, and, if not properly treated, interferes seriously, and perhaps fatally, with his progress. He reached the conclusion that airsickness is caused by poor orientation in space. When the body is subjected to irregular, unsteady motion, the brain receives impulses through the nervous system with such continuity and violence that they are not interpreted properly. The child who becomes carsick, riding on a train, the traveler who succumbs to seasickness, the structural steel worker who suffers dizzy spells when he is high up on a bridge or building, and the aviator whose stomach turns over while he is flying, are all reacting to a confusion of impulses flowing to the brain.

After working ten months with flight cadets, Dr. Flaherty laid out a program for the prevention of airsickness. This starts with adjusting the seat to a high position for maximum visibility, and fastening the safety belt firmly to do away with bouncing. Fliers are cautioned against staring at the instrument board. They are directed to keep their eyes out of the cockpit as much as possible and to pick up some point of reference on the ground—a sort of guide post—a long way off. In loops, spins, Immelmann turns, wing overs, and other maneuvers, the trainee is told to keep his eyes off the nose and wings of his plane. Instead, he is directed to take a straight stretch of roadway, a fence line, or even a place on the horizon as a point of reference. Above all, he is cautioned against attempting a landing if extremely airsick. He should remain at a reasonable altitude in level flight until the spell subsides.

"By orienting oneself in space by visual means," says Dr. Flaherty, "you can modify an attack and possibly ward it off altogether."

For many years we were accustomed to aero-embolism, or the "bends," as a problem in deep diving. High-altitude flights and rapid climbs in planes whose speed often exceeds 400 miles per hour have brought this problem into aviation medicine. The bends are due to the effects of decompression, which is brought about when the pilot ascends to extreme altitudes of 30,000 feet. At such great heights there is a marked reduction in barometric pressure. This liberates the nitrogen gas in the blood.

Everyone with even a small knowledge of physics knows that fluids will absorb gases in direct proportion to their partial pressure. For instance, at sea level at a prevailing pressure of 760 millimeters of mercury we breathe air composed of 20 per cent of oxygen and 80 per cent of nitrogen. Under this sea-level pressure the blood reaches a state of saturation with these two gases, and in these proportions.

But when the pilot ascends to extreme altitudes of 30,000 feet, the prevailing barometric pressure is reduced by two thirds. Accordingly, the blood will begin to give up its excess gases until it reaches a new state of equilibrium with the new diminished pressure. The liberated gas, nitrogen, tends to form as bubbles in the blood stream and produces the acutely painful symptoms commonly referred to as "bends." It is exactly the same phenomenon which occurs with deep-sea divers and caisson workers.

All this is Nature's protest against man's leaving his natural habitat, which is the surface of the earth.

Nature protests, but man, like Icarus in the myth, persists in stretching his wings toward the upper regions of the air. I suppose you could say that aviation medicine is represented by Daedalus, putting forth all his ingenuity to help youth defy Nature's bans. In the experiments which we are carrying on all the time at the Naval Medical Center in the treatment of the bends, no one has yet discovered a means of preventing Nature's protest against man's temerity.

Another of Nature's protests is shown in the condition we call a "black-out," which occurs when the flier goes through certain very rapid maneuvers.

To quote Captain John C. Adams (MC), United States Navy, the present head of the Navy's Department of Aviation Medicine:

"During aerial maneuvers, especially in combat flying and dive-bombing, the plane is frequently subjected to greatly increased gravity stress. We commonly refer to this as 'increased G.'

"The increased G exerts a profound effect upon the pilot due to the tendency of the blood to gravitate away from the heart and brain to the dependent parts of the body, especially to the lower extremities.

"The weight of the pilot in his seat is multiplied by the number of G's to which he is subjected. That is, a man whose normal weight is 170 pounds will suddenly weigh 1,020 pounds if subjected to 6 G's. Under gravity stress, the weight of the arms and legs is multiplied five and six times. Think what it means, under these conditions, for the pilot merely to lift his own right arm.

"Under the same gravity stress, the circulating blood is similarly affected. Under the effects of 7 G's, the circulating blood has the weight of iron. Obviously the movements of the arms and head and the action of the heart in maintaining circulation are tremendously affected in direct proportion to the amount of G.

"When the blood gravitates away from the brain to the lower extremities, owing to the increased G, the pilot 'blacks out,' as we say. His vision fails. If this is long sustained, he loses consciousness. Recovery from black-out depends on the plane's recovery from its gravity stress. Usually, when the increased gravity is relieved, return of vision and consciousness is prompt. However, during that brief period of time in which a pilot is blacked out, he is temporarily without effective control of his vision and is an easy subject for attack. If the black-out continues, he may crash."

Under war conditions the Navy flier is apt to be ship-based for long periods at a time. There are no leaves, and the carrier puts into no liberty ports. An aircraft carrier looks enormous compared with a P.T. boat, but one of these floating islands actually carries a population of 2,800 men. The crowding would be unendurable but for the system of dividing men into watches. Nonetheless, inevitably there is strain and what we speak of as "pilot staleness" among men living for long periods at high tension.

Fortunately the hangar deck of an aircraft carrier provides space for games of basketball, volleyball, and badminton. These are encouraged as exercise and recreation. Wrestling, boxing, and baseball are discouraged because of the high incident of minor injuries. In the tropics, the men are encouraged to sun-bathe as a means of easing nervous tension.

When over the loud-speakers comes the clang of a bell, the boatswain's pipe, and the order to flight quarters, the pilots come on a run to the Ready Room. There they read from the blackboards the orders for the flight and last-minute information as to weather, wind direction, the ship's course, and other pertinent facts. These they must jot down to take with them while they wait for the order to man the planes.

During battle conditions the Ready Rooms may be anything but comfortable, especially for men wearing fleece-lined leather flying suits designed for keeping out the cold of high-altitude flying. At these times the ship's gas-proof envelope is closed. Ten to twenty pilots, wearing their flying suits plus bright yellow "Mae Wests," helmets, and gloves, may be crowded into a small room while the carrier is running through tropic seas under a broiling sun.

When the order, "Pilots, man your planes," comes over the loud-speakers, there is a hurried stamping out of cigarettes, a last gulping of "coke" or coffee, and the pilots file out of the Ready Room and up the hatches to the flight deck. The air officer on the bridge gives the order, "Start your engines." An armorer checks the bomb load, gives the "thumbs-up" signal to the pilot, and points to the starting officer. At his signal, the plane roars along the deck, gathering speed, and springs into the air as the big carrier continues to dip into the trough of the sea and mount the next wave. No sooner is the first plane off than the second, third, and others follow, until the whole patrol is on the wing. Slowly, to the watchers aboard the carrier, the planes gain altitude. The sound of the motors gradually dies away as each darts off to its assigned arc of sea and sky.

Stop for a moment and ask yourself where these men have gone. They have taken wing into an environment for which man was not formed by Nature, and for which he has no primitive or instructive aptitude or experience. There was never any pioneering to compare with this. The conditions of this new environment make severe demands on the pioneer's body and mind as he rises to 10,000 feet and more. First, as we have seen, he must resort to artificial means in order to breathe. He must wear fantastic, uncouth garments to protect himself against the piercing cold of the upper air. As he mounts higher and higher, eyes, ears, lungs, heart, and arteries are put to severe tests. The blood begins to give up its excess gases to maintain equilibrium with the decreased barometric pressure. If the flier has any physical handicap or weakness, if his physical reserve is low for any reason whatever, now is the time when that lack will make itself felt.

The pilot of a dive-bomber who has a cold in the head is apt to suffer certain painful ear disorders while flying at high altitudes, or in rapid descent. A man with any chronic upper respiratory infection may develop permanently impaired hearing as a result of long-continued high flying. As a matter of fact, fewer aviators today become deaf than in the postwar decade. This is probably owing to the more careful physical selection of flying personnel.

Above all, this pioneer is alone. True, he is in constant radio communication with his ship and with other planes in the flight, but this communication is by an invisible wave, something still so new to man and so little understood as to have slight effect on his emotions. As he continues to mount to still higher altitudes and lower clouds obscure the sea, all his senses impress on him the feeling of intense solitude.

The pilot whose health is good, whose nerves are steady, and whose morale is sound, experiences this acute sense of loneliness without disastrous effects. But the man who is already nervously fatigued, and therefore apprehensive and moody, or who may be maladjusted to life aboard a carrier, who is unhappy or worried about his wife or sweetheart at home, or about recent crashes and the deaths of comrades, is in bad shape to meet this emotional assault. From the R.A.F. have come numerous whimsical tales of "gremlins," which seasoned pilots tell us, and without batting an eye, delight in making trouble for pilots and increase the chances of a crash. The gremlins are not pure whimsey. They are real in the sense that they are the devil spawn of fatigue. They are let loose by the effect on the pilot's nerves of exhaustion, tension, apprehension, and the uncharted solitudes into which he soars alone.

All this—not excluding the gremlins—must be understood by the flight surgeon, whose duty is to keep as many men in as many planes as many hours as possible.

Don't get the idea that fliers are temperamental, sensitive souls who have to be handled with gloves, or coddled. On the contrary. The initial weeding-out process is designed to discover and eliminate any who are emotionally unstable. The flying service inevitably attracts, but does not want, the brilliant, high-strung, erratic types of young manhood who may make spectacular stunt fliers but have not the physical reserve and stability of the emotions that flying requires. Most of those who make the grade and win their wings are quiet, easy-going, not readily excitable chaps. Seeing them in the wardroom at dinner, in their crisp dress whites, which are the required wear at sea even in war areas, doing full justice to the beefsteak-and-ice-cream menu of which the Navy never seems to tire, chaffing each other, exchanging stories of the day's flying, keeping the conversation carefully away from mention of accidents or of comrades they have seen take off into the blue and not return, they are as fine, healthy, steady, and alert a group as you could find anywhere in the world.

It is the flight surgeon's job to keep them at that level. To do this, he must know them all as intimately and comprehensively as possible—know them in their relaxed, off-watch hours, playing bridge, poker, or the interminable acey-ducey, the special variety of backgammon which apparently enthralls the United States Navy. He must be admitted by them into their full confidence in order that he may be able to read in each one of them the first warning signs of strain and fatigue.

Actually, what we are out to create in the flight surgeon—who is, I suppose, the most modern type of physician—is a personality patterned after the old-fashioned family doctor, the doctor who knew all his patients so well and understood their backgrounds, families, and jobs so thoroughly that meeting Bill Robinson on the country road, and leaning out of the buggy or mud-spattered Ford to chat with him, he could read in Bill's face and manner that things were not well with him and suggest, "Drop in at the office the next time you are in town. I want to have a talk with you."

The Navy believes in preventive medicine, and this applies to its aviation program no less than to its programs for the control of typhus, typhoid, and venereal disease. Pilots are valuable material. They cost the Government thousands of dollars to select and train. Planes are valuable. And pilots and planes are needed in the war machine. It is up to the Medical Corps to take as intelligent, thorough care of the pilots as it is up to the technicians and ground crews to take care of the planes.

The flight surgeon must be more than a bit of a psychiatrist. He must understand and be capable of helping the man who finds himself maladjusted to Navy life or who is too sensitive, shy, or self-absorbed to play with the other fellows and so get the necessary therapeutic value of rest between watches. He must be able to straighten him out, if necessary, about the girl back home. In short, he must be skillful at keeping his patients physically and mentally free from fatigue, with its attendant apprehension, moodiness, and inattention.

His own flying experience will have taught the flight surgeon, as books and lectures cannot, what goes on inside the body and mind of the pilot flying hundreds of miles through glaring sun, heat, wind, rain, sleet, or piercing cold. He knows the tricks anoxia plays with the vision. He knows the agony of the bends, with the nitrogen in the blood forming into bubbles at the joints. He knows, for he himself has lived through it, the panic of suddenly blacking out.

The flight surgeon is usually the chief medical officer aboard a carrier. Frequently, since his immediate concern is the flying personnel, he is the eye, ear, nose, and throat specialist of the medical staff. Since many of the physical ailments—short of accidents and battle casualties—to which pilots are susceptible fall within this category, the eye, ear, nose, and throat doctor is logically the medical officer the men seek out first. This puts him in close contact with the pilots, where he can discover the symptoms of pilot fatigue before it progresses and can advise and prescribe for it.

But though the flight surgeon's work is with the flying personnel, during battle the entire medical staff aboard a carrier functions as one unit, under the command of the chief medical officer. Never was this system better illustrated than aboard the U.S.S. *Lexington* in the last hours of that gallant ship.

The story of the *Lexington* is now familiar to every American. For weeks she, with the carrier U.S.S. *Yorktown,* had been operating with a task force in the Coral Sea.

During the battle of May 8, 1942, both the *Yorktown* and the *Lexington* suffered casualties which resulted in serious injuries to the officers and crews. Captain William D. Davis, senior medical officer of the U.S.S. *Yorktown,* was commended for gallantry during the engagement and for his organizing ability, which brought his medical department to a high state of efficiency, thereby saving many lives and much suffering among the seriously burned or otherwise injured. Aboard the *Lexington,* the dental officer, Commander Wadsworth C. Trojakowski (DC), United States Navy, who had taken charge of the emergency dressing station on the main deck, was killed in the battle when a shell wrecked the dressing station.

Both carriers came through the battle, and, it was believed, without suffering fatal damage. Several hours later, while the *Lexington* was running at full speed, the explosions began which ultimately wrecked her. One of the torpedo hits she had sustained during the engagement had apparently damaged the gas lines. As the vapors from aviation gas, seeping through the storage tanks, became ignited, the explosions took place. When these began, Commander Arthur J. White, senior medical officer aboard the carrier, was in the operating room, attending to the battle casualties. The first of the explosions threw him twenty feet down the passageway, where he landed up against the bulkhead. His right clavicle was broken and both ankles were badly sprained. However, he managed to drag himself back to the sick bay, where he had twenty-five or thirty wounded requiring surgical treatment.

For weeks, ever since the *Lexington* had left Pearl Harbor with the task force headed for the South Pacific, Dr. White had been training his staff of doctors, pharmacists, and hospital corpsmen in a comprehensive plan of action, which could be counted on to operate during battle without a hitch.

"The story of the medical service aboard the *Lexington,"* Dr. White has insisted to me more than once, "is the story of a plan that worked. What made it effective and enabled us to get all the injured off the carrier without losing one of the hundred or so patients was the perfect co-operation of every member of the medical department."

According to this plan, stores of medical and surgical supplies and dressings were placed about the great ship wherever a number of men would be stationed during battle, and easily available to them. At each of these places one or two hospital corpsmen, well trained in advanced first aid, were on duty. The medical officers were dispersed about the carrier, in emergency dressing stations equipped with instruments and devices for doing minor surgery. The object was to treat casualties as close to the scene of their injury as possible, and as immediately as possible. Only the most severely wounded and those requiring major surgery were carried down to the main operating room, where Dr. White was in command.

It must be borne in mind that during battle all hatches aboard ship are battened down, shutting off one deck from the decks above and below it. The hatches may not be opened during action except by order of the skipper or the exec. In each hatch is a scuttle—a hole eighteen inches in diameter—just big enough for a man to crawl through. The scuttle is fastened down and opened by a large turnscrew.

It is a job for an able-bodied man to get the scuttle open, squeeze through, fasten it behind him, and go down the companion ladder to the deck below. Taking burned and wounded men down through the scuttles presents a serious—sometimes impossible—problem.

Getting the injured down from the funnel catwalk was another tough job the hospital corpsmen had to handle. They rigged lines and pulled steel stretchers up to the catwalk. The injured, who had been given first aid by a corpsman up there, were lashed into the stretchers and lowered sixty feet to the flight deck. The wounded who had to be sent down to the operating room in the carrier's bow were lowered through the scuttles in the same convenient steel stretchers.

Dr. White continued to work in the surgery for more than three hours after the first torpedo hit. Meanwhile, more and more explosions occurred, and the fires started by them spread through the galleries of the lower deck. The communication system and then the lighting system were thrown out of commission. All work in the interior of the ship, and this meant in the hospital and operating rooms, had to be done by battery lights. Then the ship's ventilating system was rendered useless. The temperature below decks was above 100 degrees. At the same time, the carrier was listing heavily. Vapors from the gas were seeping through the ship. There was no knowing when or where the next explosion would occur.

Dr. White gave the order to evacuate all the patients below deck. The procession of stretcher-bearers and the injured who were still able to walk moved cautiously through the smoke-filled passageways, crawling over heaps of debris until they reached the companionway ladder. Dr. White went up this to open the hatch. All the light he had for the job was that of the battery flashlight fastened to his forehead. He tried to turn the heavy locker bolts, but he couldn't move them.

"I suppose because my right clavicle was broken," he said, telling me about it. "I hadn't realized until then what the damage was to my shoulder."

The doctor had to come down the ladder and let one of the hospital corpsmen go up and open the scuttle. So up two ladders and through two scuttles, fighting their way through the smoke and fumes, breathing through their smoke masks, the procession came at last onto the flight deck. All the injured brought from all parts of the ship—about 110 men—were taken to the flight deck until the destroyers came up to take them off.

The Navy Cross was awarded to Dr. White for his service aboard the *Lexington,* but, as he insists on telling the story, "Honors are due the staff which functioned according to plan and without confusion, not only throughout the battle of that morning, but through the desperate hours when the *Lexington* was literally struggling to keep afloat."

Stories of individual heroism make inspiring reading, but what counts and what saves lives in the long run and in a long-drawn-out war is wise, comprehensive planning and the training of men to follow that plan during an emergency.

CHAPTER VI

# They Call Him "Doc"

AS THE BLUEJACKET SAYS IT, there's an untold amount of regard, trust, and even embarrassed affection packed into that single syllable "Doc." The medical officer is "doctor," but the pharmacist's mate or even the hospital corpsman, wearing the red Geneva cross on his left sleeve, is invariably "Doc" to the rest of the crew, whose faith in his ability to relieve pain, diagnose, and prescribe for them at times reaches boundless proportions.

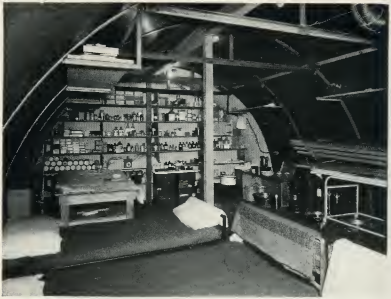
The best illustration I know of this confidence, not misplaced, of men caught in an emergency in one of themselves who had a hospital corpsman's training, happened aboard one of our submarines operating in the South Pacific.

A seaman, doubled up with stabbing pains, which even the uninitiated felt meant acute appendicitis, consulted the pharmacist's mate. The sub carried no medical officer. The nearest naval surgeon was thousands of miles and many days away. All the medical skill aboard was vested in Pharmacist's Mate Wheller Lipes, who was down on the records as an electrocardiographer. Armed with the *Hospital Corps Handbook* and the *Medical Compend,* which the Navy publishes for commanders of vessels to which no member of the Medical Department of the Navy is attached, Lipes was competent to take care of the general health of the submarine's crew. Appendicitis, however, presented a problem of another sort.

The skipper had a talk with Lipes. There was no doubt about the

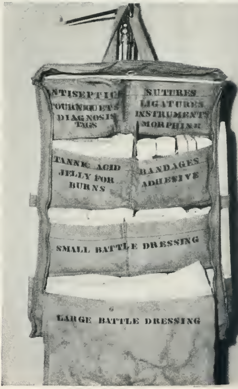
*Official United States Navy photograph*

CRASH DETAIL, UNITED STATES NAVY HOSPITAL CORPSMEN



*Official United States Navy photograph*

FIRST-AID STATION



CONTENTS OF EMERGENCY KIT CARRIED BY HOSPITAL CORPSMEN, UNITED STATES NAVY

*Reproduced from article by Commander O. B. Morrison, Jr. (MC), United States Navy,* Navy Medical Bulletin, *April 1942* gravity of the seaman's condition, and there was no chance of getting him to a Navy surgeon before the appendix ruptured. The sub was running submerged and in an area where enemy cruisers and destroyers were operating. The skipper put it up to Lipes, as man to man: "Do you think you could operate on him?"

"I think so, sir," Doc replied.

In his service of three years at the Naval Hospital in Philadelphia Lipes had seen several appendectomies. It wasn't anything he had ever thought of doing himself, but now it was a question of trying to save a man's life. It is wonderful how the urgency of that thought releases and enlarges any man's powers.

The skipper sent him in to have a talk with the patient, who had had his nineteenth birthday the day before.

"Look," Doc said to the boy, "I never did anything like this before, but I'm willing to take a chance if you are. And it is only fair you should know that your chances of pulling through anyway are pretty slim."

The seaman knew it. Hours of pain had given him all the warning he needed. He gave Lipes a long look. "All right," he said. "I'm game. Let's get going, Doc!"

The first thing needed was an operating room. The only place available was the wardroom, which, aboard a sub, isn't much bigger than a drawing room in a Pullman car. The table, fastened to the floor, just about fills the space between the two benches (transoms, we call them). In all submarines these rooms are so low that a man has to bend his knees preparatory to sitting down. With the "surgeon" and his four assistants, not to mention the patient, it was going to be a tight fit.

They went ahead and got the room ready, under Doc's instructions. First came the question of light. When submerged, the lights in a submarine are never very strong. One of the big floodlights, used for night loadings, was rigged up to illumine the table. The skipper told Lipes to choose his assistants from among the sub's officers. Doc thought carefully, then appointed one of the lieutenants his assistant surgeon; the communications officer he made the anesthetist; the engineering officer was detailed to act as circulating nurse. It was up to him to see that boiling water and alcohol for sterilization kept coming as needed. A chief yeoman was given the job of instrument passer. The sub's skipper, Lieutenant Commander W. B. Ferrall, kept tally of the sponges placed in and taken out of the operating field and of the retractors used to keep the wound open. It was the cook's job to sterilize the retractors and send them in from the galley as called for. He also kept a double count on the skipper. They weren't going to leave any leeway for mistakes. Actually the retractors were tablespoons of monel metal, bent at right angles. The sub carried no regular surgical instruments for this purpose, but surgeons have made use of tablespoons in this way for years—I have myself—and there really isn't anything any better. To sterilize the spoons and the scalpel—for which the machinist had to rig a special handle—they used boiling water and alcohol, which they drew out of the torpedoes.

One thing bothered the amateur surgeon a lot. That was the problem of administering ether. When running submerged, the pressure inside a submarine is above the atmospheric pressure. More ether is absorbed under pressure. The supply aboard was five pounds, but there was no knowing how long it would take the amateur surgeon to perform an appendectomy, and whether five pounds of ether, at that pressure, would be sufficient to keep the patient anesthetized throughout the operation.

But that, too, was something they had to take a chance with.

When the room and the instruments were ready, the operating staff slipped on pajama jackets, turned backward, which a seaman buttoned up on them. Over their faces they wore gauze bandages as masks. Rubber gloves, dipped in torpedo alcohol, were drawn on the "surgeon's" hands. The fingers were too long and the rubber tips hung over grotesquely.

"You look like Mickey Mouse, Doc," commented one onlooker.

Lipes worked the fingers of the gloves up into place and nodded to the anesthetist. The patient lay on the hastily contrived operating table. It was only just long enough for him. The anesthetist came forward and put the ether mask, made out of a tea strainer from the galley covered with gauze, over the patient's face. There was no need for directions. The amateur anesthetist had been well instructed to watch the patient's pupils dilate.

Following the old hand rule, the "surgeon" put his little finger on the patient's navel, his thumb on the point of the hipbone. Extending the index finger at a right angle, he located the point for the incision. As he cut through the layers of muscle, the "assistant surgeon" placed retractors in the incision to hold it open.

It took Lipes nearly twenty minutes to find the appendix. "I've tried one side of the caecum," he reported after the first few minutes, "now I'm trying the other." The report ran back through the crew's quarters and the engine room, "Doc has tried one side of something; now he is trying the other side."

The bow and stern planesmen heard it and knew what they had to do—keep the sub steady below the stormy sea while the amateur surgeon did his stuff.

The tenseness that filled the operating room was relieved when Lipes whispered, "I've got it, I think! It's curled way up into the blind gut. Two more spoons," he ordered.

The engineering officer passed them obediently, and the skipper, with a look at the clock, made a note on his pad. "Two spoons at fourteen forty-five o'clock."

The patient's face, lathered with white petrolatum, began to twitch. "Give him more ether," ordered Doc. The anesthetist looked doubtfully at his supply, shrunk now to hardly three quarters of a can. He soaked the tea strainer again and fitted it over the patient's face. The ether fumes rose, thickening the wardroom air. The operating staff felt themselves grow dizzy. "Want those blowers speeded up?" the skipper asked.

At last came the moment when the "surgeon" reached out his hand and pointed toward the needle, threaded with twenty-day chromic catgut. One by one he took out the sponges, the skipper counting and making a note of each one and the bent tablespoons which were passed back to the cook in the galley for the recount. There was one missing. The skipper nudged the "surgeon" and pointed to the tally on his pad. Lipes felt round in the incision, found the last spoon; the skipper drew a line through the score, and the cook nodded agreement.

When the wound was sewed up, they lifted the patient and carried him into the diving officer's bunk, who had had control of the ship during the operation. It had taken the team of amateurs two and a half hours to do the job ordinarily done in forty-five minutes. But they had done it, and successfully.

Half an hour after the last tablespoon was counted, the patient opened his eyes. "I'm still in there pitching," he whispered. Two weeks later he was manning the battle phones as the submarine launched torpedoes at an enemy cruiser.

On a shelf in the sub stands a glass bottle containing an appendix —the first, as far as anyone knows, ever to have been removed under sea and in enemy waters.

The Hospital Corps of the Navy came into existence by an Act of Congress during the Spanish-American War. In 1896 a further Act of Congress specified that the corps should be a constituent part of the Medical Department of the Navy and that its personnel should consist of chief pharmacists (commissioned warrant officers), pharmacists (warrant officers), and the enlisted ratings of chief pharmacist's mates, pharmacist's mates, first, second, and third class, and hospital apprentices, first and second class.

Our Hospital Corps was patterned after a similar corps in the British Navy which had been in existence since the reign of Henry VIII.

Henry VIII deserves a better place in history than is usually accorded that uxorious monarch. His physician, John Kaye, interested the King in pharmacy and medicine, with the result that His

Majesty was influenced to put through a series of acts planned to protect the public from quack healers and to raise the status of the physician. Under these laws, and for the first time, physicians were required to pass certain examinations and be licensed before they could practice. From these regulations, and while Henry VIII still ruled Britain, the Royal College of Physicians, the first purely medical corporation in Europe, was brought into being.

Henry was still on the throne when the Cabots set forth on their epoch-making voyages, which opened the new Western Hemisphere to British fleets. Many of those great captains were careful about the type of men they selected as fleet and ship surgeons. In King Henry's navy it was the custom to detail certain members of the crew to nurse the sick and assist the surgeon in treating the wounded during an engagement with the enemy. These early hospital corpsmen were known as "loblolly boys," the name being derived from the porridge called "loblolly," which was served to the sick. The name "loblolly boy" persisted in the British Navy and in our own up to one hundred years ago, when the Bureau of Medicine and Surgery was organized. Their duties were laid down in the *Navy Regulations* of 1814: "The loblolly boy will announce sick call in the morning by ringing the bell about the deck. He will feed, wash, and shave the sick, and provide a tub of sand to catch the blood during surgical operation to prevent the staining of the deck."

When the newly enlisted man goes to a naval training station, he is given an opportunity to sign up for any branch of the service, including the Hospital Corps, that he has the desire and aptitude to join. If he elects the Hospital Corps, he has to be approved by the medical officer at the training station. He cannot be assigned to the Hospital Corps, which is a part of the Medical Department, by a Line officer. In other words, he must make the grade. And the grade is a steep one. Hospital corpsmen are required to have had at least a high-school education. If the "boot" has had any additional education or training in laboratory technique, so much the better. Many of them have. Perhaps he has been a student of dentistry, chemistry, or medicine. He may have been a soda-jerker in a drugstore but has picked up a smattering of pharmacy. He may have been a lawyer's office boy or a butcher, a high-school teacher or a bricklayer's apprentice, a hard-coal miner or a truck driver, and still show the desire and the aptitude which will make the medical officer approve him for the Hospital Corps School.

Not long ago a young corpsman was giving me a rubdown. I complimented him on his ability as a masseur and asked where he got his training. He grinned and replied, "I've had lots of practice, sir. Only not on live ones. Before I joined up, I was a mortician's helper."

That made me think of something which happened early in my service with the Marines when we first took over the Philippines.

We had a number of hospital corpsmen who were not only new in the service but had never been out of their own country before. Naturally they came in for a lot of hazing at the hands of the old-timers. At the time our temporary morgue was a dark cave in the wall surrounding the old Spanish Navy Yard in Cavite. One evening a death occurred, and the body was placed in the morgue for burial next day. The master-at-arms, an old-timer, stationed one of these young corpsmen on watch in the dimly lighted cave and told him to stay there until he was relieved.

It happened that this recruit had been an undertaker's assistant before he enlisted. A corpse didn't disturb him, but the swarms of mosquitoes and other bugs which infested the island did. As the night wore on and he got tired of slapping, he had the bright idea of picking up the corpse and setting it upright in the chair which had been given him, then he lay down on the slab, pulled the sheet over his face, and went comfortably to sleep.

Sometime during the night the master-at-arms either took pity on the guard or wanted to see how he was taking it. He came in with a sandwich and a cup of coffee. He offered it to the figure in the chair.

When no response was made to his offer, he exclaimed, "Well, if you don't want it, I'll throw it on the deck!"

At that the sheet covering the body on the slab was thrown aside and a voice protested, "Hey, don't do that! Give it to me!"

The master-at-arms is still running!

At the Hospital Corps schools the men are instructed in advanced first aid and the care of the sick by Navy nurses.

In one of our naval hospitals a young corpsman was nursing a patient seriously ill with pneumonia. He was instructed to notify the doctor of any change in the patient's condition, as the man was about to pass the crisis. In the early evening the corpsman called the duty officer and told him the patient had passed the crisis. On questioning the corpsman, and learning that there had been no change in the patient's temperature or pulse, the doctor asked him to elaborate on his opinion.

"Well, sir, the patient just had a bowel movement. It certainly looked peculiar to me. I am sure, sir, when you see the specimen you will find the crisis!"

Those who qualify for it are given courses in laboratory technique. After graduation, they serve in naval hospitals ashore, or are assigned to ships where they serve under the medical officers.

With them goes their Bible, the red-bound *Handbook of the Hospital Corps,* published by the Navy's Bureau of Medicine and Surgery, which contains information on everything a hospital corpsman could ever need to know—from field sanitation to embalming, electrocardiography, X-ray work, and diets and messing for the sick. All in all, this is one of the most comprehensive volumes ever put together. The man who is up on it is one of the most generally useful men you can have aboard ship, or working with you in a jungle, or be cast away with on a desert island. These are the men who give the first medical and surgical assistance to the Navy's wounded, at sea and in landing parties. With every landing party of Marines goes a hospital corpsman who has been trained by the Navy. With every detachment of paratroops there are several hospital corpsmen to make the jump with them and be with them in the field.

When he goes into action, the corpsman carries his bag of dressings, instruments, and drugs. He is equipped to give morphine, the sulfa drugs, and injections of blood plasma as soon as possible. He places fractured limbs in splints, following the rule of the corps: Splint 'em where they lie.

In the report of Rear Admiral William Chambers (MC), United States Navy, of an inspection trip in the South and Southwest Pacific he said, "Illustrating the constant attachment of pharmacist's mates to fighting units, and their application to duty, I discovered that no more than ten or twelve cases are known in which a wound casualty had to apply his own dressing or sulfanilamide powder, carried in his first-aid packet. Nearly always there is a corpsman at hand to give first aid."

Obviously the hospital corpsman who goes into action with Marines, sailors, and Coast Guardsmen must be trained and equipped to protect himself. He is taught to recognize "terrain" shelter, to flatten his body, to read maps, to follow contours, and find co-ordinates. He is disciplined in chemical warfare and adjusted to nerve-shattering explosions of bombs and shells. He learns in this training how to detect angles of fire and how to pick out the points of danger and points of relative safety in an area which is under violent bombardment. In short, he is trained as a part of the fighting machine—a very vital part, as his job in action is to help keep the fighters fighting.

From our front in the Solomon Islands comes this story of a Navy hospital corpsman serving with the Marines. His name is Harold McFann. His rank, pharmacist's mate, third class. Before the raid on Pearl Harbor he was a law student at the University of Indiana. In his dreams he may have imagined himself addressed as "Your Honor." Not in the wildest nightmare did he hear himself called "Doc," or conceive that he would hold top score for citations in the Solomon Islands' fighting. Yet this one-time law student, now pharmacist's mate, has twice been recommended for the Navy Cross by different commanders of his outfit, and once for the Silver Star.

Here is the story:

On the evening of the first day McFann saw action in the islands he was with a group of Marines lying close to a road running down one of the mountain valleys of Guadalcanal to the sea. Down the road came a company of Japs. In the fight that ensued a wounded Marine fell near a gravely injured Jap. McFann went to the aid of the American and was treating him when one of the enemy crept up on them. This Jap had no pistol, but he pulled a knife and attempted to stab McFann from behind. The corpsman could not get his own pistol out but he wrenched the knife from his assailant and killed him with it.

While this was going on the Jap lying near by, and apparently dying, started to crawl toward the wounded Marine to attack him. McFann intervened and used his pistol effectively to save his comrade.

On another night, during the battle on Lunga Ridge, "Doc" McFann was again out with a detachment of Marines which was cut off from the rest of the line by infiltrations of the enemy. The Marines dropped back but were stopped by machine-gun fire. Digging fox holes in the sand with their helmets, they crouched low, waiting for daylight. Whenever the enemy worked in close they let them have it, even holding back the fire of their automatics until the Japs were at point-blank range.

When the first dawn light gave them a view of their surroundings, the Americans began stealthily to fall back toward the jungle. Two of their wounded were unable to move with the rest. The colonel ordered McFann to go back for them.

McFann went. Between him and the two wounded men lay a ridge which was swept by three enemy machine guns. "Doc" brought out one boy with a badly wounded leg, then went back for the other. This man had a head wound which made him dizzy and difficult to handle. But McFann made it, threading his way over the ridge and, miraculously, without injury to himself or either of the wounded.

Two weeks later, when the Marines were disputing the crossing of the Matanakai River with the enemy, a flanking movement was started to wipe out an enemy machine-gun post. Six snipers on a ridge were trying to pick off the Marines, while the fire from enemy machine guns and mortars played along the flank. It was McFann's job to crawl up on the ridge and get two wounded men. One had his thigh broken; the other had been shot in the chest.

To get them, McFann had to cross a 200-yard strip of open ground swept by enemy fire. He reached the injured men, gave morphine to the one with the chest wound, swung him on his shoulder, and carried him across the danger zone. To bring down the second casualty he made a sling out of a rubber poncho and carried him to safety. Then he and a corporal loaded the wounded on a tank and took them back over the jungle trail to headquarters.

At all times the Hospital Corps under the charge of the Navy's medical officers serves all naval activities, including the Marine Corps and the Coast Guard, as well as certain insular civil communities. Chief pharmacists and pharmacists serve as assistant administrators in naval hospitals within the United States, in our possessions, and in base hospitals. Some are assigned to procurement services, to schools as teachers, to experimental and control laboratories, and to hospital ships.

There are many isolated naval radio stations along the Atlantic and Pacific coasts, which are entirely inaccessible during certain seasons of the year, where you will find a small detail of men with a member of the Hospital Corps. He is the health officer of the station, responsible for the well-being of the personnel. In the course of a year this man may be called on to treat every sort of injury and ailment from hives to a broken leg. In lonely reaches along the coast where there is no civilian doctor within call "Doc" may be sent for to deliver a fisherman's wife of a baby, treat pneumonia, or to patch up a head broken in a drunken brawl.

Before the present war turned the entire South Pacific into a war arena, at various remote islands in the Philippines, in Samoa, Guam, Midway, and Palmyra, members of the Hospital Corps were stationed to act as health officers for the civilian population as well as for the military personnel. It is amazing what many of these men have accomplished. Remember, they are not doctors; but also they are a great deal more than male nurses. They are well trained and experienced in advanced first aid, in pharmacy, and bacteriology. They have studied the laws of sanitation and are frequently competent to serve as sanitary engineers. Their service to the Navy has been written from Haiti to the Solomons.

The pen of a Stevenson or a Melville is needed to do full justice to the adventure of the eighteen men of the minesweeper U.S.S. *Quail,* who escaped from Corregidor and made the 2,000-mile journey down through the straits and island-locked seas of the Philippine Archipelago to the north shore of Australia in a thirty-six-foot open boat.

Lieutenant Commander Morrill's leadership and skill in navigation have been highly commended by the Navy Department. Scarcely less remarkable was the part played in that adventure by Pharmacist's Mate William Head, of the U.S.S. *Quail.*

In the last days of the siege of Corregidor, when two thirds of the *Quail's* crew were ordered ashore to join the thinning rank of defense forces of Fort Hughes on Caballo Island, Head was one of those who went. His services were sorely needed. The casualties were so heavy during the last hours of the fort's defense that the underground hospital was filled to overflowing. The floor was slippery with blood. Two Army doctors kept on working, hour after hour, as the cases were brought or staggered in. Then a shell injured both doctors, leaving only an Army medical corpsman and Pharmacist's Mate Head to carry on.

When Commander Morrill cleverly contrived to bring the small launch he had salvaged close up to Caballo Island and sent a couple of men ashore to try to round up as many of the *Quail's* men as wanted to make the attempt to get away, Head was among those who crept low through the island underbrush and finally clambered aboard the launch. According to reports, he had hoped and planned for escape. Even during the confusion and tragedy of those last hours before the surrender of Fort Hughes, Head had found time to pack a duffel bag with all the medical stores within reach. He brought that bag with him when he joined the others on the launch. It was destined to become first a joke, and then an object of reverence to the other men. So many valuable things came out of it just when they were sorely needed. Possibly no valise in all literature except that packed and carried by the mother of the Swiss Family Robinson yielded so much valuable material.

Morrill and his seventeen men were all undernourished and physically exhausted when they made their escape. They had come through about as intense and disheartening fighting as sailors ever were called on to endure. It was a question whether they could make the 2,000-mile journey in an open boat even if they succeeded in keeping out of the enemy's clutches. That was the problem the commander put up to Head. It was going to be "Doc's" job to safeguard the health of the crew, to assure them unpolluted water, and when they ran low on the canned rations which they had salvaged along with the launch, to trade for fresh foods with the islanders—foods which Head's experience made him know would be safe to eat.

Morrill brought his men away from Caballo Island and down through the narrow Verde Island passage under cover of the dark. It was a breath-taking, hair-raising trip, for Manila Bay and the passage were full of enemy ships. At dawn they pulled in to the shore to rest and lie hidden. Head took that opportunity to visit a native village, where he traded his medical services for fresh water, chickens, and vegetables.

From the earliest days of our occupancy of the Philippines our gunboats had patrolled the passages between the lower islands and had become a familiar sight to the natives. They quickly got the idea that every one of these American ships carried a medico, on whom they could call for assistance. The bancas would come out to the ship, and pleading or demanding voices would call for the medico to come ashore. We doctors always went, of course. That was part of our job. If the ship carried no medical officer, and the importunity of the natives could not be put off, it was up to the skipper to go ashore with his pharmacist and do what they could to meet the demand.

Commander Morrill knew this, of course, as every officer who ever served in the Philippines does. So did Head, who, in the guise of a medico, became one of the most valuable men in the party when it came to getting supplies and assistance from the natives of the southern islands.

Stealthily the band of adventurers made their way down through the tortuous strait which separates Leyte and Mindanao, out into the open Pacific. By the time they made it, they were all in better physical condition than when they started. In fact, in the whole thirty-day voyage to Darwin, Australia, not a man was ill and all of them gained weight. This on a diet of sardines, corned beef, sausages, rice, tinned tomatoes, tinned milk, coffee, sugar, and the coconuts, papayas, bananas, and chickens bargained for from the islanders. Meanwhile, their respect for Head's bag of supplies grew daily.

Morrill laid his course southward toward the southwestern tip of New Guinea. The sea is dotted with hundreds of small islands, many without water and uninhabited, others peopled by more or less savage natives. The islands are officially Dutch, but few of the natives speak this tongue, or even understand it, as the Americans were to find out.

When they put in to Sajafi in need of fresh food and water after days in the Pacific, again Head went ashore to attempt to trade with the fierce-looking lot of savages who gathered on the beach and eyed the boatload of Americans suspiciously. Sign language and the password "medico" brought its reward in coconuts, bananas, and fresh water to fill the eight five-gallon water breakers the launch carried. Head didn't take any chances with the water supply, however. Again he drew on his bag—for chlorine. While he set up an impromptu dispensary on the beach, the others of the *Quail's* men got a chance to rest and bathe before they pushed off again that night.

As they ran out of the islands flanking New Guinea, into the open sea, with Australia ahead, a final demand was made on Doc's duffel bag. The boat needed a flag. Once again the pharmacist's bag did not fail them. It yielded needles and thread. White skivvies were sewn together into an oblong. A square field was cut from blue dungarees, and twenty-four holes in the shape of stars cut out of it. This was patched onto the white foundation, with good effect. For the red stripes, Doc's help was needed again. He produced a bottle of merthiolate, used as an antiseptic, which dyed strips of skivvy shirts, which in turn were sewn on the white foundation. The finished product wouldn't have passed Navy regulations, but it established the nationality of the boat's crew as Commander Morrill finally brought it around Melville Island to Darwin, ending the sea adventures of eighteen men in a boat.

CHAPTER VII

# Navy Nurses at Sea and Ashore

IT'S A LONG JUMP from Florence Nightingale, in a voluminous, long-skirted gown moving through the filthy wards of a war hospital in the Crimea holding a kerosene lamp, to a bobbed-hair girl in dirty blue dungarees carrying an electric flashlight and being shoved down the hatch of a submarine that had dared to steal inside the Japanese patrols around Bataan. The men aboard the pig boat did not know that this particular refugee they were helping aboard wasn't a man until one of them put his hand on her head to push her down the hatch. "My God! This one's a woman!" he exclaimed. From under his hand came, reassuringly, "Just a nurse."

That was how Agnes Ann Bernatitus, one of the Navy's nurses, escaped from Corregidor. That same afternoon she had been assisting the surgeons in operating. Because she was so valuable to the Navy's medical work in the Pacific, she was ordered aboard one of the submarines for evacuation to Australia before the Rock fell to the enemy.

The Navy Nurse Corps, which was established by Act of Congress in 1908, is a part of the Medical Department of the Navy. Its members are registered nurses, graduates of the best schools of the country. The regulations of the Corps ordain that the Navy nurse shall be a citizen, unmarried, and shall pass a physical examination which is sufficiently exacting to keep out of the Corps any applicants who may not be physically fit to perform their professional duties in all climates and every sort of environment.

Navy nurses are appointed with the relative rank of ensign, and may rise to the rank and pay of captain, which is the rank held by the superintendent of nurses.

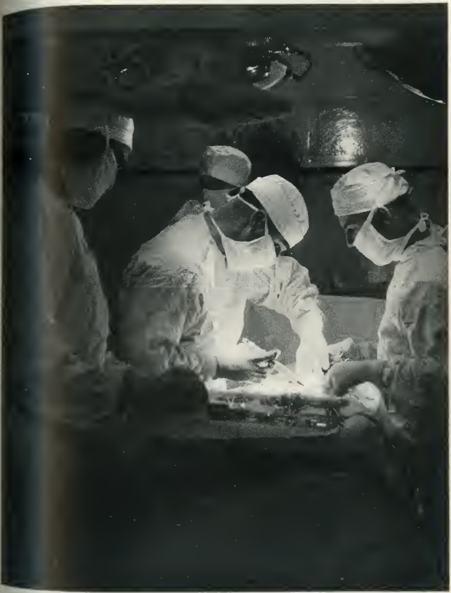
In addition to the regular Corps is the Naval Reserve Nurse Corps, authorized by the Naval Reserve Act of June 1938, to which a nurse may be appointed from civil life. The Reserve nurse takes the oath to serve the Navy in time of war, or during a national emergency declared by the President for as long as the services of the Naval Reserve are required. If members of the reserve are called to active duty, they have the same pay, privileges, and allowance as the members of the regular Nurse Corps.

Upon appointment, the nurse is sent to a naval hospital within the United States for initial assignment. She is transferred to hospital ships and to stations beyond the continental limits of the United States after she has received indoctrination and training in Navy routine.

In our hospitals, members of the Navy Nurse Corps teach and supervise in the wards, operating rooms, Hospital Corps training schools, dispensaries, and outpatient clinics. They are also responsible for the nursing care of the dependents of officers and enlisted men in the family hospitals attached to the naval hospitals. They may specialize in training as dietitians, anesthetists, and physical therapists, at government expense, provided they demonstrate unusual aptitude for the type of work selected.

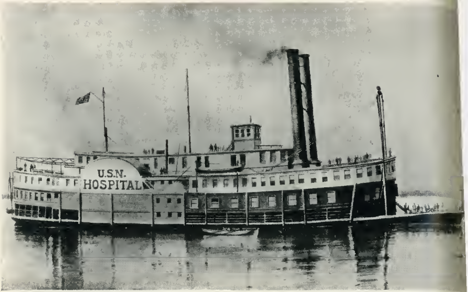
The nursing duties of the Navy Nurse Corps have been increased to meet the rapid expansion of naval personnel, including the Women's Reserve of the Naval Reserve. The Hospital Corps training schools have been increased to meet wartime needs, and are staffed with members of the Navy Nurse Corps who are qualified instructors of nursing arts.

In the hospitals, the major part of the nurses' duty is to train hospital corpsmen in nursing. The nursing ability of each hos-



*Official United States Navy photograph*

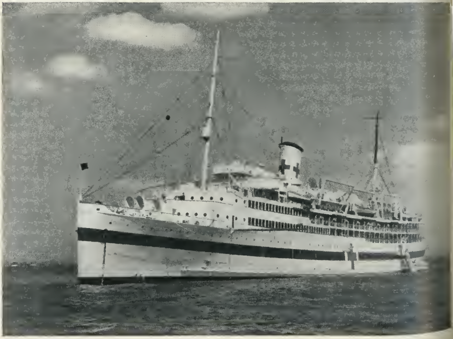
UNITED STATES NAVY DOCTORS PERFORM EMERGENCY APPENDECTOMY EN ROUTE TO AFRICA



*RED ROVER,* FIRST NAVY HOSPITAL SHIP, 1862

U.S.S. *SOLACE,* THE NEWEST NAVY HOSPITAL SHIP

*Official United States Navy photograph*



pital corpsman depends, in large measure, upon the care with which he has been instructed by the Navy nurse.

It is on the hospital ships and hospital transports that the Navy's nurses do one of their biggest jobs in peacetime as well as in war.

When the nurse reports for duty aboard a hospital ship she steps into a world that is quite different from a naval hospital ashore. She learns to say "topside" and "down below" and "up and down the ladder." She learns to step up every time she moves from one compartment to the next, to keep from stumbling over the high cowling. She gets accustomed to whistles, guns booming at unexpected moments, the screech of winches, the sluice of water over the decks, blowers and electric fans whirring constantly, and innumerable thumps and bangs. She learns the technique of abandon-ship drill, all of which necessitates evacuation of patients in stretchers from the hospital beds and over the side into small boats. She learns to go about her duties in the wards wearing a life jacket, a helmet, and carrying a gas mask. At any moment she may find herself embarked on a cruise to some new port. There the hospital ship lies at anchor while the fleet maneuvers in nearby waters. The nurse gets shore liberty in strange and unusual lands, and has a chance to see the sights. Like all of the Navy, she readily falls a victim to the wily shopkeepers and their alluring display of goods.

It is reasonable to assume that no first-class nation will carry on a major war in these times without employing hospital ships to serve the Fleet. Several types of floating hospitals are required, such as a fully equipped hospital ship, hospital transports, ships for advanced bases, and smaller craft for inland waterways and for evacuating larger ships.

The hospital ships *Relief* and *Solace* are good examples of the fully equipped ship, which serves as a base hospital where ships of the Fleet rendezvous. They have a capacity of from 400 to 500 patients and are as well equipped as any first-class hospital, both for professional treatment, including dental work, and from the standpoint of refrigeration, commissary, and storage facilities. The *Relief* was designed as a hospital ship from the keel up, while the *Solace* is a converted merchant ship.

These ships serve the Fleet and are prepared to handle any type of injury or disease. They carry a selected group of specialists and technicians, as well as female nurses. They can follow the Fleet from base to base and, if necessary, proceed to sea and serve the disabled ship after a battle.

When a battle is over, every effort is made to remove the sick and wounded from fighting ships as quickly as possible, since their presence seriously interferes with the morale of the crew and with repair of the damage suffered from the enemy's fire.

In addition to our two hospital ships, the *Solace* and the *Relief*, we now have a number of transports used to convey sick and wounded from battle zones to hospitals ashore. These are converted liners, the construction of which lends them readily to this purpose. They are fast enough to give them advantage over enemy submarines. Actually, these converted liners are not hospital ships, in that they are not intended to take the place of hospitals ashore. They are really sea-ambulances.

In the Solomons we are now operating a fleet of flying ambulances, evacuating the wounded from Guadalcanal to mobile hospitals in New Zealand and Australia. A number of young women who have served as airline hostesses are being used as nurses in these ambulance planes. Airline hostesses in peacetime are required to be registered nurses. The Navy believes that their flying experience helps them in caring for the casualties.

There is no record of any hospital ship in our Navy until the Civil War. Then the Mississippi steamer, *Red Rover,* which had been captured from the Confederates, was converted into a floating hospital to serve with the flotilla on the Mississippi. The *Red Rover* was an old-fashioned side-wheeler. The majority of historians and popular novelists, writing about the Civil War, have passed over the story of our inland Navy of 120 vessels, which operated on the Mississippi and its tributaries, and the naval stations at Mound City and Cairo, Illinois.

The fleet surgeon of this inland flotilla was Dr. Ninian Pinckney, an outstanding surgeon, and an officer of such ability that Admiral Porter wrote of him that he "afforded a fresh illustration of the old saying 'that the most valuable goods are generally put up in small packages.' "

Aboard the *Red Rover* Dr. Pinckney made use of the services of some Catholic nuns who volunteered to nurse the wounded after the siege of Vicksburg. These Sisters of Mercy were among our first Navy nurses.

The first real hospital ship we had after the *Red Rover* was the U.S.S. *Solace,* commissioned in 1898, which did duty at Guantánamo Bay and in the Philippines. Many of the Marines wounded in the Boxer War were transferred to the *Solace* for treatment. The *Solace* served us well up to 1921, and has been succeeded by a fine new ship, bearing the same name, which was put into commission just four months before the raid on Pearl Harbor. During World War I we had the hospital ships U.S.S. *Mercy* and U.S.S. *Comfort.* The U.S.S. *Relief,* commissioned in 1920, is still going strong.

In recent years her name has given rise to a number of jokes, notably that about the lady who boasted that her son was "a medical officer on the *Relief,*" to which her neighbor retorted: "But I thought Navy doctors were well paid."

The *Relief* has another story to its credit, vouched for on excellent authority and reported by her officers as proof of her reputation for skillful service. One day a wounded seal flopped up on the gangway. The story goes that she came back daily for dressings until all the wounds were healed. After an absence of a month or more she returned one morning proudly displaying a baby seal. "But that," my friend Captain Lucius Johnson, known as one of the Navy's best story-tellers, invariably adds, "was after I left the ship."

Only once during the twenty-two years of active service of the *Relief,* as far as anyone knows, has it been necessary to postpone an operation because of bad weather. That was during a typhoon off New Zealand in 1925. It should be remembered that the weather at sea—as in your own home town—is usually good. Sometimes, in very rough weather, the surgeon may have some difficulty in keeping himself steady while he works, but this is a rare occurrence, since the hospital ship is usually at anchor somewhere in a quiet berth. When it moves with the Fleet, it follows along with the tankers and beef ships of the train.

A fleet hospital ship, like the *Relief* or the *Solace,* functions like a Navy ship with a large sick bay. Maintenance and handling of the ship are looked after by the Line officers and crew, the same as on all Navy ships. The chaplain looks after the moral and spiritual welfare of the personnel and arranges their entertainment. The ship carries, at all times, a year's allowance of all supplies except biological and perishable articles.

The senior medical officer is responsible for the administration of the Medical Department. There are usually ten or more medical officers, including specialists in eye, ear, nose, and throat, urology, psychiatry, and roentgenology. There is a dental staff. Female nurses, under a chief nurse, and a number of hospital corpsmen do the nursing.

In addition to her seagoing clinical facilities, the modern hospital ship may carry a complete field hospital of approximately seventy beds, packed and crated, which on short notice can be set up on shore for duty with an expeditionary force, or for relief work in a civil disaster.

That the U.S.S. *Solace* should have been under fire at Pearl Harbor was an experience unique among hospital ships. As a rule, our floating hospitals are carefully kept away from possible damage. In peacetime, the hospital ship attached to the Fleet remains in a harbor, or moored somewhere in the roads, while the fighting ships are out engaging in target practice or war manuevers in near-by waters. In war, hospital ships are given all the protection possible, as under the laws of the Geneva Convention they are unarmed.

Conforming to the Articles of the Hague Convention of 1907, hospital ships are supposed to possess certain advantages, some of which are immunity from attack and capture, and tolerance in neutral ports! If belligerents followed the stipulations of this convention—which their representatives have solemnly signed—the advantages would be great.

In the preparation of the treaties governing the use and protection of hospital ships, the best available minds of the legal, naval, and diplomatic professions of many nations were assembled. These men made every effort to incorporate their ideas in the various articles in clear and unequivocal language, which should be capable of but one interpretation. However, minds equally clever to those of the treaty makers are busy trying to find loopholes in the agreements, or ways of bending them to their temporary needs. It must be remembered that the pressure for success at any price is so great that strong adherence to rules imposes a great strain on the character of any military leader. An enemy may become desperate in defeat, or arrogant in victory.

During World War I hospital ships were commanded by medical officers, but the actual navigation was done by auxiliary Merchant Marine officers. This was changed in 1921, and now these ships are commanded by Line officers, with a senior medical officer in charge of the Medical Department. There has always been much discussion as to who should command these floating hospitals.

During the last war I was in command of the hospital ship U.S.S. *Comfort.* In the spring of 1918 we were ordered to France—as some newspaper described it, "to test the faith of the Huns." Some sixteen hospital ships had already been sunk, or badly shattered by submarines.

We were properly marked with the broad green band and red cross, and were going to cross the Atlantic fully lighted. A few days before sailing, objections to the so-called "suicide voyage" were expressed very vehemently, by the press, in letters to me and to Congressmen, and on the floor of Congress itself. Time dragged on, as the objections became more forceful, and finally the trip was abandoned. The *Comfort* was finally painted a "war color" and proceeded across the Atlantic in convoy.

In 1937 I was detailed by the Navy Department to represent the United States at an international committee of experts, which met to revise the Hague Convention of 1907 in regard to the use and protection of hospital ships in war. Numerous important developments, such as submarines, aviation, and radio, had assumed a permanent field in warfare since the first convention, making many of its provisions inadequate.

We assembled in Geneva. There were thirteen representatives from as many nations present. The meeting lasted ten days, and certain revisions and classifications of the old treaty were adopted after lengthy discussions, and approved by the members.

These findings were to be discussed further by the officials of the International Red Cross, and then submitted to the various nations of the world for approval by their governments.

The present war began shortly after. In consequence, we are still operating hospital ships as before—and, I fear, with the same disregard for their humane mission.

Many of the Navy nurses are sent to duty on our island possessions. At Guam we always had several nurses to take care of casualties among the naval personnel and to do necessary public-health work among the native population of the island. There were more than 20,000 of these—mahogany-colored Chamorros, speaking a mixture of a Polynesian dialect and Spanish.

Whenever Navy nurses or medical officers who have served in Guam, the Philippines, Samoa, and Haiti get together, somebody invariably starts the discussion as to which group of islanders is more intelligent and potentially progressive than the others. To date, there is no unanimously-agreed-on answer to the question.

However, all agree that the islanders—from the rich *café-au-lait* colored Samoans to the mahogany-colored Guamese—may adopt the white man's ways and follow them just as long as things run smoothly. Let some real trouble develop—something which brings the white man's ways into conflict with native tradition—and they jump like jackrabbits back to the ways of their fathers.

When we took over Guam during the war with Spain, leprosy was a common disease among the islanders. The pitifully disfigured creatures roamed the road leading from Apra Harbor, five miles up to Agana, the largest settlement on the 300 square miles of island, tinkling their warning bells as they approached a settlement. Householders set out bowls of food for them as an act of charity, but nothing was done to segregate them or to prevent the spread of the infection. Frequently a family would conceal a case of leprosy, keeping the sick member hidden in the house, or in a hut in the yard.

One of the first jobs the Navy had to do in Guam was to round up the lepers and start an educational program among the natives to make them understand the dangers of contagion. This public-health work was carried on by Navy nurses under a medical officer. An important part of their work was the establishment of prenatal and baby clinics and a training school for native nurses.

A chief native nurse, whom the Navy had trained, developed a rather suspicious condition of the skin, which was eventually diagnosed as leprosy. She was a most beloved character, and a very sad atmosphere pervaded the community when she was finally transferred to the island of Culion, the leper settlement in the Philippines.

Somewhat similar to leprosy is gangosa, which causes great tissue destruction of the face; it is a disease which is prevalent in Guam and, to a lesser degree, in other tropical islands. The Navy nurses would ferret out all the children infected and have them ready for the medical officer of the transport when it made its regular monthly stop at the island. Sometimes the array of cases requiring surgical treatment was pretty bewildering. They ranged from harelips to all sorts of growths and infections.

One medical officer, whose ship put in at Guam for a brief stop, was met by the request to make a rectum on a Chamorro baby for whom Nature had not provided this necessary device. The skipper was impatient to get going, and the medical officer had to remind him that repairing bottoms was a frequent job in the Navy. The skipper made the entry in the ship's log: "Held up to fix baby's bottom."

One of the characters of the island was Maria, who cooked, washed for, and waited on the American Navy nurses for years. Every nurse who has served on Guam remembers Maria. Being a permanent fixture at the nurses' home, as you might say, she assumed a proprietary air over it and all its furniture. When a ship would come in and there were guests at dinner, no one presumed to interfere with Maria's decoration and arrangement of the table, or her code of protocol. She could draw the fine distinction between a Medical Corps captain and a commander of the Line with an acumen that would have done justice to a chargé d'affaires at an embassy. When the China Clippers began their service, making regular stops at Guam, Maria was in her element, hoping for more guests at the nurses' home on whom to exert her culinary skill.

When the enemy took Guam, the Navy nurses who were there became captives. They were put out of their house, which was taken over by a Jap officer, and confined in a small hut not far off. Not even the enemy could confine Maria or limit her in her activities. Every day she beguiled, bribed, or browbeat her way through the Japanese guards, and turned up at the hut to give our nurses the same devoted service she had given them before the Japanese occupancy. The nurses who were taken captive on Guam were ultimately exchanged along with other prisoners of war, and came back to the United States months later on the ship which brought Ambassador Joseph C. Grew.

To most Americans Pago Pago is neither more nor less than the place made famous by Somerset Maugham's play, *Rain*. Those who have made a South Seas' cruise remember its wide and beautiful harbor—one of the finest in the South Seas—backed by jungle-crowned hills. The overpowering scent of ilang-ilang blossoms is blown out to sea, so that you smell them almost as soon as you sight on the horizon that green blur which is the island of Tutuila.

Pago Pago was a coaling station for American ships as early as 1878. During the last decade of the last century there was a headlong race between the European powers to get hold of islands in the South Pacific. In the group of fourteen islands which comprise the Samoas, the feuds between native chiefs and the intrigues of European copra planters and traders brought about a state of inter-island warfare which enlisted the sympathy of Robert Louis Stevenson. He threw himself into the Samoan "war" heart and soul.

Eight islands of the group ultimately were ceded to Germany, which had established trading centers and missions on them—no doubt with that end in view. The six remaining islands were given by their native chiefs to the United States.

Our Government was a little nonplused by the gift, and didn't know quite what to do with it. We weren't equipped for, or desirous of, imperial expansion. We had just annexed the Philippines and found ourselves faced with the Herculean job of cleaning them up. President Theodore Roosevelt proposed that the Samoan Islands be turned over to the Navy, and that is what happened. In 1914 a detachment of New Zealanders seized and occupied the German-held islands of the group and have continued to hold them ever since.

For years Samoa was a forgotten spot in the Pacific to most Americans and a responsibility for the Navy, which had to maintain a civil governor there and educate and look out for the health of eleven or twelve thousand islanders. We have lived to see this coaling station become a vitally important link in our offensive in the South Pacific. Undoubtedly the enemy's attempt to strike southward through the Marshalls and Gilberts at the close of January 1942 was a pincer movement toward Samoa.

Nurses are stationed in Samoa at our small hospital. The ships of the Fleet in the Pacific put in at Pago Pago to coal and oil and to evacuate sick or injured men for treatment in the island hospital. The chief naval medical officer is also the public-health officer of the island, with the nurses working directly under him.

The Samoans are among the best developed of all the Polynesians. They are a handsome, light-brown people, speaking a soft, musical language, and are nearly as picturesque as the islanders in a Dorothy Lamour film. They are affectionate and extremely fond of children. A public-health program, therefore, which was aimed at improving the health of the children, was one which all Samoans readily accepted. Since the American occupancy of Tutuila and the other five islands, the effect of our health program has been shown in the rise in native population and in the decrease in elephantiasis, a disease prevalent in the islands.

The Navy nurse making regular trips to the villages in the hills is welcomed eagerly and royally. She is apt to find her hosts know an amazing amount about her in advance—her tastes, manners, and even intimate details of her wardrobe and life. In Samoa everybody is the other fellow's cousin, and no one would dream of withholding a bit of gossip about the amazing Americans from the least of his relatives.

Missionaries have been established in the islands for many years and have brought up a race of islanders who at least are professing Christians. However, the old gods and the old taboos are not entirely forgotten, as the doctor and the nurse find out when they are called in to treat and care for cases of serious illness. The Samoan is extremely polite and will accept the American doctor's prescription and even take his medicine. While he takes it, however, he may insist on the presence of an elaborately tattooed medicine man, who he believes is competent to do what no white doctor or nurse can do—exorcise the spirits of the dead who, according to island tradition, steal out of the bush and cause human beings to fall ill by laying hands on them. Every islander, no matter what Christian denomination he has been baptized in, will ascribe his stomach-ache to an evil spirit and never to the feasts of barbecued pork on which he may have gorged himself. Babies are brought to the hospital dispensary while running a high fever, with their ears and nostrils packed solid with a pulp of chewed leaves to prevent the entry of evil spirits.

An important part of our nurses' work in Samoa is training native nurses. The island girls are very gentle about the sick, and willing to learn. The Samoans are great swimmers and bathe frequently, but one thing the native girls stick at is wearing shoes! They pad about the hospital ward in their bare feet, and no amount of Navy discipline can make them do otherwise.

Naturally, with women in a service in which men predominate, the question of etiquette presents something of a problem. At what point does the nurse cease being a woman and become a naval officer? And—harder to define—where does she leave off being an officer and become woman again? Still more difficult, how does her superior male officer combine the offices of officer and gentleman?

I don't know whether the Navy Department took counsel with Emily Post, but the rules of etiquette finally arrived at state unequivocally that the rules of military courtesy apply to men and women in the service. That is, rank takes precedence. The junior —man or woman—salutes first. Because military courtesy includes deference to women, and because a senior's wish is an implied command, if a senior male officer indicates that he wishes the junior female officer to go ahead, then it is her military duty to go, without hesitation, blushes, or any fuss and feathers.

As to hats—where nurses and Waves, being women, naturally keep their hats on even though men remove their caps—as in church, at mess, or in the theater—it is presumed by Navy regulations that the hat is not being worn as a badge of office, but in conformance to civilian and not military custom. In such instances the salute is not given.

## CHAPTER VIII

# Ounces of Prevention

YOUR ACQUAINTANCE with the armadillo may be limited to the confines of the crossword puzzle. Or you and he may have become aware of each other through the bars of a cage at the zoo. Whichever way it is, it is unlikely that you ever thought of getting better acquainted with this toothless, armor-plated South American cousin of the groundhog; or that the armadillo was going to become a health concern for all Americans.

Generally speaking, there is nothing to object to in the armadillo *per se*. But recently it has been discovered that this diminutive tank carries riders in the shape of ticks, some of which can infect man, if they get on him and bite him, with a vicious form of sleeping sickness.

Ordinarily, the armadillo sticks to his native habitat, which is south of the Panama Canal. But he is not without curiosity; and this curiosity, plus hopes of an improved diet, brings him close to the habitations of men. And he brings his riders along. Since our ships put in constantly at South American ports, our medical officers, who are concerned with preventive medicine, have their eyes fixed suspiciously on the armadillo and his *Trypansoma cruzi.*

So far, sleeping sickness is of rare occurrence in the United States Navy. We intend to keep it so, and will keep an eye on the armadillo.

From the earliest times the Navy's medical program has been directed along the lines of preventive medicine. The way we figure it is that it is better than to treat them and to patch them up after the injuries. A comprehensive program of hygiene and sanitation aboard ship and in the field has been worked out with this end in view. No small amount of what seems to the "boot" unnecessary red tape and fussiness is in reality preventive medicine. The old-timers, with a lot of hash marks on their sleeves, know this. Many of them have served on the Asiatic station, have seen the thousands of pockmarked faces in the crowded bazaars, and the pitiful beggars who are lepers. They know that one sneezing and spitting coolie can spread death by pneumonic plague among dozens of healthy lads gone ashore in a liberty party. They have a suspicious attitude toward fresh, low-growing green vegetables which, in many parts of the East, are still too frequently fertilized by human excreta, collected in the cities and sold from sewerage barges to the market gardeners.

As one old-timer, who was being treated aboard one of our hospital ships, remarked to the nurse who was trying to get him to eat spinach for the vitamins in it: "Vitamins may be what you call what those weeds have in them. Not me. What I call it isn't a word to say to a woman, not even a nurse!"

When the recruit goes to a training station, he is promptly vaccinated against smallpox and given injections against typhoid, yellow fever, and tetanus. This is routine procedure. If the vaccinations and inoculations do not take, they are done again, to make sure. If necessary, we do them a third time. The Navy is taking no chances with its men. With these preventives, the sailor is ready for duty anywhere.

In that famous modern armada which took our first troops to North Africa, Army and Navy medical officers worked constantly during the voyage to make sure that every single man aboard the 850 ships had had his full quota of vaccine and antitoxin. And to get satisfactory "takes" on those who, through some mischance, had been missed previously. It was the doctors' duty to see that not a man landed in Africa or was aboard a ship lying off the shore of the Dark Continent whose blood stream had not been fortified against possible infections.

Smallpox, because of the care in respect to vaccination, is kept at the edge of non-existence in the Navy, notwithstanding the fact that on some foreign stations, as in Chinese waters, exposure to particularly virulent forms of the disease greatly increases the danger of infection. The Navy represents one of the most highly vaccinated groups in the world, and the results with Jenner's discovery continue to indicate its tremendous value. What we still need are improved methods of packing to retain the potency of virus while in transit to distant parts of the world and through many climates.

Every so often among civilians in the United States, where smallpox is comparatively rare, there is a lessening of the regulations prescribing vaccination. Some religious or nature cult bans vaccination among its members. Then comes an epidemic in which lives are lost and many persons are disfigured for life, with all the psychological results of such disfigurements. Every epidemic of every sort everywhere in the world is a matter of interest to the Navy's medical officers, as any one of them, at any time, anywhere, may endanger the life of a Navy man.

When a ship is ordered to a part of the world where cholera is raging or is prevalent, all the personnel are vaccinated against it as a general preventive measure.

Cholera, typhoid, paratyphoid, hookworm disease, and dysentery —all diseases transmitted by discharges from the intestinal tract— are spread by polluted soil or water. It is less than one hundred years since the scientifically enlightened nations of the world became aware of these facts, and only within the last forty or fifty years that many communities in the United States have made concerted efforts and spent public moneys to assure their residents pure water and safe sewage-disposal systems. In view of this we are not in a position to look down our noses at the Orientals and primitive races in Africa and the South Pacific among whom health is not a matter for science but for magic and religion. What we have to do is to spread among them what we know about preventive medicine and meanwhile give our men, who must go to those ports, pounds and not just ounces of protection.

I was ordered to the Philippine Islands within three months after being commissioned. The Filipinos were still "insurrecting," and the war was still going on. Detachments of Marines were ordered from the United States, and they crossed the continent in special trains, each train accompanied by six Marine officers and a medical officer, of which I was one.

On our arrival on May 1, 1902, there was a very severe epidemic of cholera devastating the Islands, and I was soon in the midst of it. The disease had already attacked our Marines in Olongapo, and also members of our small camps around Cavite Bay. A few days after my arrival I was ordered to Olongapo, about eighty miles from Manila, to assist the doctor already there. We had Marines encamped on the outskirts of the station and at points in very close proximity to the Bataan region—of recent sad memories.

My senior medical officer was ordered to proceed to a small native village down the coast—Bagac—to look into the cholera situation. After four days no word had been received from him. As the natives were not particularly friendly to Americans, I was ordered to proceed to this town as a "relief expedition" to rescue my senior officer, if necessary, or at least to ascertain his fate. I sailed on one of the small gunboats commanded by Midshipman Freeman—now Vice Admiral Charles S. Freeman.

The weather was bad, and the China Sea more than usually turbulent. There was no port at the village, so I had to go ashore in a small pulling boat and land through the surf. It was pouring rain, and we were encumbered with rubber coats and boots, revolvers and belts of ammunition. We didn't look much like a medical expedition.

However, I hadn't much time to think of appearances; the heavy surf kept me too busy. My experience in landing through breakers was nil. This fact was impressed on me in short order when a wave overturned the boat and our party floundered about in the water—I, it must be admitted, doing the most awkward part of the floundering. By the time we crawled up the beach, followed by the boat which the sea conveniently sent after us, I had made up my mind that being a medical officer in the Navy was going to call for more skills than just those it takes to diagnose disease and do surgery.

There was no hope of drying out during that incessant rain, so as soon as we caught our breath we started through the jungle for Bagac, led by the native scout we had along with us. It wasn't much of a trail we had to go by. We had to fight our way through mangrove swamps, wade small streams, and keep a constant lookout for snakes.

As we neared the village, we heard bells ringing. Our presence had been discovered and the signal was being given to call the men in from the fields to repel invaders. It was a primitive "alert." I, for one, didn't much like the sound of it. I began to think that maybe a comfortable practice in a comfortable office in a well-policed American city wasn't so bad after all.

We emerged through the bush and found the villagers all out of sight. The old-timers in the party gave me to understand that though we saw no one, hundreds of eyes were probably fixed on us, and perhaps several dozen rifles had us covered from behind fences and heaps of underbrush. I cannot ascribe my coming through that encounter without a sniper's bullet in me to heroism on my part. I can only surmise that those natives were unable to believe that any Americans who looked as forlorn as we looked then could be dangerous.

Slowly, half a dozen of the villagers emerged from the nipa huts, no doubt leaving others to keep us covered. Our scout talked with them and tried to question them about the doctor we were looking for, but he could get nothing out of them. We were unable to find out if the doctor had reached the village, or, as I got the scout to question, if there were cases of cholera in the settlement. If there was any cholera in Bagac, we were not permitted to see it, or to know of its existence. The natives, apparently, preferred to rely on their primitive methods of treatment or to accept the disease as inevitable than to submit to investigation and treatment by a foreigner.

No wiser than when we came, we started back to the beach and our boat. On the way we ran across Freeman with a rescue party. He had heard the bells and was afraid we had been ambushed. We talked it over, decided there was nothing we could do about the missing doctor, and boarded ship to return to Olongapo. It was a very bad night. I spent my time in the bow of the gunboat, lying flat on the deck, keeping a lookout for buoys and signs of shallow water. There was nothing in my medical training that fitted me for this seamanship, but Freeman expected it of me. His look seemed to imply: you've got ordinary common sense, haven't you? I was determined to show him I had, even if I hadn't distinguished myself particularly at Bagac. There was still the ignominy of being landed on the beach like a halibut that I had to live down.

On our arrival in Olongapo we found the doctor and his party that we had gone to relieve. He, too, had given up the natives at Bagac as unwilling, even belligerently unwilling, patients and had come in to the station, having hiked over the hills.

There is no way of helping those who refuse to be helped except through such preventive measures as can be effected by law and which will apply equally to all the inhabitants of every community. That is what the United States Public Health Service made great efforts to establish in all the islands in the Philippines and with such telling results that for the past twenty-five years Manila, which used to be called the sinkhole of the Pacific, has been one of the most healthful ports in the East. The cholera was bad elsewhere in Asia in 1937–38, but Manila remained notably free of it. Australia and New Zealand are also cholera-free countries.

At the same time that I was making my first acquaintance with cholera, Manila was undergoing one of its bad plague epidemics. The medical officers of the Army and the Navy and the doctors of the United States Public Health Service worked together, and desperately, to rid the city and the villages inland of rats which we then suspected, but did not actually know, were responsible for the spread of the Black Death.

The rat had been under suspicion for some time, but it still remained to be proved how the disease was transmitted from rats to man. It wasn't until 1907, and until after all of us on duty in the East had encountered plague—both bubonic and pneumonic—among the natives and, alas, among our own soldiers, sailors, and Marines, that it became known, through the researches of an officer in the Indian Plague Commission, that the fleas carried by the rats transmitted the disease to man. In climates where three quarters of the native population went barefoot, there seemed not one chance in a thousand of keeping feet and legs from being bitten by fleas. Our Marines used to curse the puttees and leggings which were part of regulation uniform. Or at least they did until they had seen one or more of their comrades develop the telltale buboes and black spots which spell plague, and it was borne in on them that this was the horrible result of being bitten by the wrong kind of flea.

Since those days tremendous advances have been made in ship construction, with the result that modern ships are practically rat-proof and vermin-proof. There are no dark, damp—and potentially verminous—cracks and corners in a modern steel ship. There is no wood to harbor bugs and their larvae. And there is incessant, strict inspection of all compartments, especially of the sleeping quarters, galleys, food-storage compartments, butcher and barber shops to see that these are clean at all times, the decks dry, and the men who work in them personally clean and free from skin disease, colds, and other infections.

Think what it means to a ship's efficiency to have ten or a dozen men down sick and unfitted for work. A ship carries only as many men as are needed. Each member of the personnel is specially trained for the particular job he has to do. The loss of one of them leaves a gap which can't be filled at sea. There is no sending a ship's boat round to a near-by employment agency to bring back two machinists, a gunner, and a couple of cooks.

In Manila we built the first rat-proofed wharves in the world. They were needed, because practically every ship that came in from the other islands, from Japan or China, had its cargo of rats, some of which might be plague-infected, or some member of the crew already down with or on the verge of the disease.

These conditions were true of practically every seaport in the Orient. Human beings were not yet aroused to the idea that diseases which can't be cured may be prevented. They had the fatalistic attitude that seeps through so much Eastern thought, reflecting the philosophy of peoples among whom the birth rate is so high and the food supply so limited that the death of one individual—or even of hundreds, or thousands, in a year—carries no tragedy.

In all our hospitals the wounded of our Allies are admitted and treated with the same care as our own casualties. One day during World War I a Chinaman was brought in with multiple wounds of the face due to shrapnel. He was assigned to a bed in a large ward and made comfortable.

The "diagnostic" squad visited him and wrote on the tag on his bed: "Redress, Dakin's solution, enema." A short time later the treatment squad came around, treated the wound, and checked it off. The enema was administered, but they forgot to check it.

About an hour later another treatment squad came around, noted "enema" on the tag, and administered it. They also forgot to check it. The patient was much impressed by this remarkable manner of treating a head wound, but he may have shared the idea of many other Orientals that Americans have a curiously backward way of going forward. Anyway, he was most acquiescent.

The senior medical officer made his usual inspection later, noted the various treatments, and in general approved them. On reaching the Chinaman's bed, he read the tag and said, "Oh, enema." The bandaged patient raised up in bed and protested: "Me no enemy, me ally!"

During World War I the most destructive disease in the British armies operating the East Mediterranean area, Macedonia, and Gallipoli, was dysentery. As a matter of fact, this disease has ravaged armies in warm climates for as long as the history of disease has been written. During the Civil War in this country there were as many as 285,000 cases of dysentery in the Federal Army.

Dysentery is of various types, but the most common forms are spread by polluted water and soil. Obviously, wherever armies are encamped for some time field sanitation presents a grave problem.

Several years ago a survey was made in the Navy of 10,000 men, all of them stationed where amoebic dysentery was highly endemic. It was found that there was a very low rate of dysentery among the Navy's men in Panama. The survey of the submarine group, specially chosen because the men aboard a submarine live at closer quarters than any other men in the Navy and spend long periods of time without fresh air and sunlight, revealed no spread of the disease; showing that our rules of ship hygiene were proving an effective preventive. The third group of men who had recently seen duty in Peking, Shanghai, or the Philippines showed a percentage of 26.1 infection. Obviously it is our men serving in the East that we have to guard most carefully against dysentery.

Aboard ship the sanitary regulations are necessarily strict. All the heads must be kept clean at all times. Flies and cockroaches which can act as carriers of dysentery are warred against continuously. The vessels used in the galley are required to be sterilized in steam. Cooks are forbidden to mix food by hand. The ship's water supply is guarded rigorously.

In the old days of sailing ships it used to be said that more men died from the water inside the ship than from that outside it. Certainly the scuttle butts were frequently dirty and the fresh-water supply taken aboard in ports was subject to many infections, including cholera, typhoid, and dysentery. One of the greatest advances the Navy has made in preventive medicine has been in ship construction, ventilation, and the perfecting of systems for evaporating and distilling drinking water from sea water. This has cut down the danger of typhoid. The inoculations against this, which all men are required to take at regular intervals, have finally eliminated this scourge which was the major cause of death in the British Army during the Boer War and of our Army in the Spanish-American War.

The French have never been celebrated for liking fresh air. Just the same it was a French shipbuilder of Brest who designed the first porthole and introduced this method of ventilation in the old wooden galleons. Modern ships are built with ventilating systems which operate throughout the vessel. Blowers and fans send fresh sea air through every compartment below decks. Even so, and especially during war when ports are sealed and hatches battened down at "battle stations," it frequently gets hot and close below decks. This is especially true aboard submarines. Which makes me think of a story.

Sailors have a great fondness for pets, and the men are always bringing them aboard—all kinds of pets, from marmosets to kinkajous. It's part of the medical officer's job to examine the pets and pass them. One day a sailor from a submarine came back from liberty, carrying a baby skunk. The officer of the deck objected. The sailor explained that the creature was a pet and that he was fond of it. "But you don't want to take it below decks where it's so crowded!" the officer persisted. "Just think of the odor down there!"

"Let him get used to it!" said the sailor. "The same as I did!"

The rules of personal hygiene, laid down in the *Bluejackets' Manual,* are directed toward the prevention of typhus as well as other insect-borne disease. Typhus is carried by body lice and, therefore, can always present a menace where men are forced to live in crowded quarters for long periods of time. Typhus is usually epidemic during cold weather—when heavy woolen or fleece-lined clothing is worn, and when men may not be inclined to bathe as frequently as in warmer weather. Poland and Russia are the great centers of typhus in recent years. During World War I there were outbreaks of trench fever, a disease which resembles malaria in its symptoms but is caused by lice. This was a new contagion to the medical officers of the Allies and one which we have been studying ever since, with the hope of preventing it.

Today we are exceedingly careful that every man in the armed forces shall be vaccinated against tetanus. This infection from animal manure, if it enters an open wound, is so frequently the cause of death that it is considered practically inevitably fatal. During World War I tetanus was the greatest risk the British armies ran. That was before we had an antitoxin to use. Twenty to thirty out of every 1,000 wounded in the British forces had tetanus. After the antitoxin was developed and put to use this rate dropped to 1 to 2 per 1,000. When our men went into the World War—after tetanus antitoxin had come into general use—the rate of tetanus in our forces was .16 per 1,000. Surely one needs no greater proof of the importance of preventive medicine than these figures convey.

We have every reason to believe that this proportion will not be increased, but materially lowered, due to improved facilities for getting battle casualties to hospitals before the infection can strike home, and to the "booster dose" which is given all wounded by the hospital corpsman as soon after the injury as possible. Tetanus and gas gangrene, which were common threats in World War I, are rarely encountered among our forces in the South Pacific. Admiral Chambers reported only one case of gas gangrene among the Marines on Guadalcanal, and no tetanus.

Any sort of wound, not necessarily one made by a bullet or shrapnel, provides an opportunity for the tetanus germs to enter. For instance, there have been many cases caused by a stab of the tail of the sting ray, a barbed tropical fish, inflicted on men wading in shallow waters where these fish are found. The wounds were not considered sufficiently serious at the time to be cleansed and dressed. Polluted soil got into them and tetanus resulted.

All these diseases are commonly grouped under tropical diseases because, with the exception of typhus, they are more common in warm climates than in parts of the earth where the winters are severe. The germs and the parasites which spread them require a humid temperature of at least 60° F. for their existence. Hard frosts destroy them. Our grandparents had great faith in the healthfulness of an old-fashioned winter, with a fairly long stretch of zero temperatures and plenty of snow. They weren't wrong about this, even though they did not know the reason why cold weather, especially dry cold, cuts down a great many serious epidemics.

But cold and stormy weather, such as is encountered in the Atlantic through seven or eight months of the year, has its own health risks in the form of colds and pneumonia. In fact, in the Navy colds of all sorts are one of our most serious health problems all the time. It is admitted that industry loses more man-hours per year through colds than through any other one ailment. The same is true of the Navy.

Naturally, all the respiratory diseases are greatly increased in winter when men have to work in intense cold and wet weather on decks that are coated with ice, and in high, bitterly cold winds. Two or three original colds or sore throats will spread an epidemic through a ship's crew if the original cases are not sent promptly to the sick bay for treatment. The men of the engine-room force, who work below decks and in intense heat, are peculiarly subject to all the respiratory diseases. When the ship is running in sunny seas these men are encouraged to spend several hours a day on deck and to take part in deck sports to get the value of the sunshine and fresh air.

There are strict rules governing the barracks in which our men are housed at the stations ashore and as regards their sleeping quarters aboard ship. In the barracks a minimum of fifty square feet of floor space and four hundred and fifty cubic feet are required per man. The heads of the beds must be at least five feet apart. Aboard ship, where space is restricted, a swing of twelve feet is allowed for each hammock. As they hang in tiers, the men alternate their positions: one tier sleeping head to head, the tier above, feet to feet, and so on.

Aboard ship a lavatory is provided for every five men, a toilet for every twenty, and a shower for every twenty-five of the crew. The *Bluejackets' Manual* teaches personal hygiene and cleanliness of body and clothing. Usually a reluctant bather is disciplined by the other fellows who have to live with him. Hammocks and bedding are required to be aired on deck in the sun. The men are taught the importance of clean clothing, especially during battle to avoid infecting possible wounds. As decks are frequently wet, the men are supplied with several pairs of shoes and encouraged to wear them in rotation.

The Navy ration is planned to include plenty of the so-called "protective foods" with the idea of giving the crew all the vitamins the body requires to immunize it against colds. But sailors are human beings, and like most of the species prefer to eat what they like rather than that which some health authority says is good for them. The natural immunity against all the respiratory diseases, including influenza which caused us so much concern during World War I, is broken down by fatigue, nervous strain, overwork, and any injuries to the body, all common during war.

But when one looks back over the tremendous advance in preventive medicine made in the last fifty years—or, let us say, since our war with Spain which marked our entry into the Pacific as a national power—one grows encouraged about the future. Let it not be forgotten that in that period we have eliminated the hazards of yellow fever, typhoid, cholera, and tetanus. It is not too much to hope that we shall soon know what is needed to be known about the filtrable viruses to wipe influenza and other respiratory diseases off the Navy's record.

## CHAPTER IX

# Sailor Ashore

IT MAY COME as a surprise to the landsman to know that up until the outbreak of war the hazards to the Navy's men on shore were much more serious than those at sea. For many years the principal cause of death in the Navy was drowning. But for the ten years before Pearl Harbor, fatalities from motor-vehicle injuries far outbalanced deaths from sea water.

The automobile, the motorcycle, and even the bicycle seem to have a fatal fascination for the sailor ashore.

At the Norfolk Naval Hospital a Marine was brought in one night, having been injured when the car he was driving ran through a bridge rail and landed in the creek below. He presented a colorful assortment of bruises but apparently no serious injuries, though he complained of an excruciating pain just above one knee. Accordingly he was sent to the X-ray department for examination. The X ray was not required to discover a two-pound catfish very much alive, which wiggled to the floor upon removal of the Marine's trousers. Its thorny fins were responsible for the severe pain. Otherwise, there were no untoward results of the motor accident, except some gross and fantastic exaggerations of this fish story.

When a liberty party assembles on deck to go ashore, the medical officer is usually apt to ask himself what will they bring back this time? Measles, chicken pox, and mumps are the regular aftermath of leaves and liberty, especially among the young lads of the crew.

I have rarely started on a cruise from a home port that I haven't had one or two cases of these childish diseases come to the hospital within the first ten days at sea. You count that cruise a lucky one when it is only measles, mumps, and chicken pox, and not infantile paralysis or meningitis that the men bring along with them from their stay ashore.

The sailor ashore on a liberty party is an inveterate sight-seer. He is willing to try anything once. That temerity extends to strange foreign foods, like the bouillabaisse of Marseilles, the stewed live eels of Nagasaki, the fifty-seven varieties of curry compounded in the Dutch East Indies, Cantonese dishes of every description and ingredient, and every kind of drink the bartenders of every nation have invented in their wildest moments.

His curiosity is not limited to the eating places. It leads him into the native bazaars and to sample exotic sweets and drinks offered there. He falls a gullible prey to the shifty-eyed guides who entice him into the dance halls, opium dens, and other unsavory resorts where he is promised the opportunity to see and experience delights withheld from the ordinary tourist. Not infrequently he brings back from these excursions some form of skin infection or a venereal disease.

That same curiosity, plus his American provincialism, heightened by drinks of liquors he has never sampled before, gets the sailor ashore into innumerable involvements with the authorities in foreign ports. These involvements call for sleight-of-hand diplomacy on the part of his superior officers to untangle. Punching a fat guardian of the peace in his most corpulent part, or resisting arrest with football tactics has landed many a bluejacket behind the bars of a verminous foreign jail. When the man does not show up aboard ship, his commanding officer sighs and sends a party under a petty officer ashore to find him, or the trail which will lead to him. Ultimately he may have to go himself and satisfy the injured pride of the authorities with profuse apologies and a show of gold braid. Time and again the medical officer is called on to go along on these appeasement expeditions, to lend support and a judicious word or two in the right spot.

In the pocket guides published and distributed to the armed services in the present war by the Special Services Division, soldiers and sailors are warned against some of the pitfalls that gape dangerously between them and the natives of the land they find themselves in. The treacherous effects of "poteen" on the unaccustomed drinker are set forth for our men who land in northern Ireland: "Watch it. It's dynamite."

No less explosive is talk about religion, or undue curiosity about the religious creeds and observances of the natives.

This is especially true of the Mohammedan peoples of North Africa and the Hindus of India. The Moslem woman's veil has been a temptation to wandering sailors since time immemorial. Instinctively they feel it must conceal the beauty of a Hedy Lamarr, and are unable to resist the impulse to pull the curtain and take a look. Actually, what lurks behind most of the veils which drape the women who shuffle through the bazaars of Casablanca, Algiers, Cairo, and Port Said is something which makes you understand that the veil is a protection to others and not just to the wearer.

However, this natural impulse, if indulged in, would threaten our relations with the Mohammedan peoples more gravely than any lurking Nazi fifth columnists. Therefore our men are forewarned to curb their curiosity and to give all veiled women a wide berth.

During peacetime our fleets frequently cruise in foreign waters and put in at many friendly ports where the officers are entertained. I remember one such cruise—a prolonged one—in which all of us, after a time, got a little tired of state receptions and dinners given for us by the army and navy of the various countries we visited. But it was a diplomatic good-will tour, and it was part of our duty to be entertained when our hosts wanted to entertain us. When we reached a port, a list of the entertainments was posted, and the officers put their names down for those they wished to and could attend. If the list of guests for a particular function did not come up to the number invited to attend that function, the skipper detailed others of us to attend. That was an official order.

We were at Gibraltar, on our way home. On the night before we were to sail one of the British regiments stationed on the Rock gave a dinner to which a number of us were invited. It was a very gala occasion, even for that particular mess, which was famous for its cooks and for its cellar. The dinner was long and excellent, and the wines offered with it plentiful and of the best.

After dinner the senior medical officer of the mess challenged me to make a punch that would go his one better. I believe I did not let our national honor at the punchbowl down. I know it was very late when the party broke up. I started to walk down the crooked, narrow streets of the Rock, in company with one of the officers from our ship, who had been particularly attentive to my brew of punch. Not that he was overcome by it. Rather it had stimulated his imagination and started him on his hobby, which was naval aviation, then still in the experimental stages. He began to expatiate fervently on the future of flying and the wonderful exhilaration felt by the flier when he takes off into space. . . .

At this my friend actually did take off. With outflung arms he stepped into space and disappeared over the edge of the Rock of Gibraltar. I had a horrible moment, waiting for the splash of his body in the sea below. But no splash came. I peered over the edge of the path, striking matches to see if a ledge of rock could have conveniently caught him. It wasn't a ledge of rock, but a geranium bed in the garden of a resident of Gibraltar whose house abutted on a road just below the one we were going down by.

The fall had knocked the wind and the poetry out of my friend simultaneously. He made no further attempt to fly. Instead, he sprawled in the geraniums and protested to me that he was a seriously injured man and unable to return to the ship. I convinced him, in nautical language and in short order, that he would have to get back to the ship whether he could or no. The first streak of dawn was showing in the east and we were due to sail on the early-morning tide. Eventually I got him up from the geranium bed, onto the road, and down to the landing place where our boat's crew grinned at sight of us, even though they decorously said nothing.

Once aboard ship it was my duty to enter on the record whether my friend had met with his bruises in the line of duty—in which case he was in for no trouble—or that no act of duty had been involved, in which case he was in for plenty of the same.

"See here, Oman"—he fixed me with his one good eye—"you damn well know I got this black eye and these bruises in the line of duty."

"How do you explain that?" I asked.

"I didn't put my name down to go to that dinner! The skipper ordered me to go. What's that, if not duty? Besides, *you* made the punch!"

I decided his argument was sound, and made the entry in my records that he had been injured in the line of duty.

That experience in Gibraltar apparently did nothing to dampen his enthusiasm for aviation. Later he specialized in this branch of the service and was the officer selected to bring the dirigible, *Hindenburg,* which we acquired from Germany after World War I, back to this country.

When a Navy man has to be hospitalized ashore he is usually in for a longer time than a civilian would be for a similar injury. This is because our men must be fit to perform any duty when they are discharged from hospital. They can't be sent back to their ships to convalesce, as the civilian worker does at home. Consequently, it is not unusual for the commanding officer of the hospital to detail his convalescent patients to do light work about the buildings and hospital grounds until they are in condition to return to the ships.

Sometimes it is not a little difficult to explain to some steely-eyed

Marine company commander why one of his sergeants is cutting grass on the hospital lawn and not back at duty. On a certain occasion at the Norfolk Naval Hospital I had operated on a Marine. His convalescence was rapid and he soon became one of the best players on our hospital corpsmen's football team. Unfortunately, however, while our team was playing a match with the Army team at Fortress Monroe, our Marine patient was so careless as to break his leg. I don't like to recall the twenty-minute interview I had with his company commander, trying to explain away that fractured leg and the circumstances in which it was incurred.

A certain commanding officer of the hospital at Norfolk many years ago had the reputation of working his convalescent patients in the garden, cutting hay, plowing, et cetera. The word soon got around among the recruits at the training station that they worked harder at the hospital than on regular duty.

One evening the medical officer on the receiving ship went below to the sick bay to see a young recruit who had been sick for a few days. The doctor took his temperature, felt his pulse, and then in a very serious but apologetic manner said, "My boy, I'm afraid I'll have to send you to the hospital."

The boy raised up in his hammock and remarked: "My God, Doctor, don't send me to the hospital. I'm a sick man."

The problem of venereal-disease control and prevention is not essentially a problem for the Army and the Navy, but for the entire civilian population. In fact, there can be no program of attack on this disease problem that does not extend to and engage the forces of the entire population. Syphilis, gonorrhea, and other venereal infections do not originate in the armed services. They cannot in any sense be regarded as war casualties. They are present at all times in the social structure.

It is true that war and war conditions in industry tend to spread venereal disease. But at the same time it is only during war that great numbers of young men are compelled to undergo physical examinations which reveal the presence of social diseases. When one reads the figures of those rejected under the Selective Service Act for a venereal infection one must remember that these men had the diseases before they ever went before the medical examiners of their local draft boards or arrived at a receiving depot. The Army and Navy are merely responsible for showing up these cases and putting them on record. Wherever local health laws rule that the cases of venereal infection which are discovered by the physical examinations for the services shall be compelled to undergo treatment, the great sifting process of the draft is accomplishing a service of tremendous and far-reaching value to the entire social structure.

During World War I, due to the combined efforts of the Army, Navy, the American Social Hygiene Association, the law-enforcement officials, and other co-operating agencies, the American forces achieved the lowest venereal disease rate of any force engaged in the war.

The United States' armed services lost 7,492,510 sick days due to venereal diseases—the equivalent of the loss of nearly 20,600 men for a year, or what it takes to man five aircraft carriers and nine old-style destroyers.

Since every man accepted for service in the Army and Navy—and for Navy industrial employment—must be free from venereal disease, all these cases were "new," in the sense that the men contracted the disease while in the services. The infections were acquired from the civil population in the ports of call. The venereal-disease rate in the Navy is, therefore, an index of the conditions in the cities which are naval ports.

As soon as the "boot" reaches a training station his education in venereal-disease control begins. Lectures, special motion pictures, pamphlets, and informal talks by Line and medical officers carry on a program of prevention based on self-denial. One of the toughest resistances which has to be overcome is the general belief that abstention from sexual intercourse is dangerous to the health of young, vigorous men. It is extraordinary how many persons believe this and how many books on health and psychology which the men have read and accepted verbatim sustain them in this erroneous belief. Every medical officer spends a lot of time explaining that continence never injured any man yet; whereas promiscuous sexual intercourse invariably does, sooner or later.

The fact that science has given us a treatment for syphilis which cures cases more rapidly than we used to believe possible and, therefore, with less loss of man-days, while it tends to prevent many of the devastating physical and social effects of venereal disease, cannot be considered a solution to the problem of its control. That is essentially a problem of preventive medicine. There is no sense in taking satisfaction in being able to cure these cases of syphilis. The only satisfaction we are justified in having comes of being able to prevent syphilis and the other venereal infections before they can happen.

It has been estimated that fully 5 per cent of all the peoples in North America have syphilis. The problem that faces us is how to cut down this percentage. It is a problem for the medical officers of the Navy inasmuch as our men, when they come ashore, are exposed to the infection from civilians.

Strict discipline aboard ship, unremitting regard for the laws of hygiene and sanitation, frequent physical examinations—especially of the men who work in the galleys, barbershops, et cetera—constitute part of our control against venereal disease. But when the sailor goes ashore on liberty, or for a leave, the Navy has no means of patrolling his circuit. We do our best to educate him in the dangers of infection and we try to build up a character capable of self-control. We try to teach self-respect and pride in the service as safeguards against promiscuous sexual adventures.

But all this education and training have to oppose the strongest, most urgent, primitive force in the human body, and as soon as the sailor goes ashore training is menaced by the effect of a few drinks and the presence of inviting and adventurous girls who hang about the ports.

It is a commentary on the times that practically every port on the Atlantic and Pacific coasts becomes a mecca for young girls from the country and small towns within a radius of one hundred miles or more. What we are finding is that many of these girls are diseased and present a graver danger to the public health than professional prostitutes, who are already known to the police and public-health officials of their localities. The girls are drawn to the port cities by the lure of war jobs and the even greater lure of adventure and freedom from the narrow environment of their home towns. In every port where we have a training station this problem exists for the Navy and for the public-health officials and citizens of the town.

You can't blame the sailor ashore for finding a girl and enjoying her companionship. Many of the men who come ashore have come from long, hard, dangerous duty at sea. They have passed through weeks in submarine-infested waters where all hands must be constantly on guard. They have fought icy gales and mountainous seas, protecting valuable convoys across the North Atlantic and to Russia. They have lived in close confinement and with men for such long stretches of time that just to go ashore among civilians and have an arm around a pretty girl becomes an excitement. In that excitement it isn't easy to remember the warnings of the medical officers. It is easy to say to oneself: "It isn't as though I was taking up with some bad woman. Why, this girl is as American as I am! If she's willing to take a chance, why shouldn't I?"

Many of these girls who are infected do not know that they are. They are unconsciously a menace; but no less a menace on that account. This is why that 5 per cent infection in the population of our country is a constant danger to our Navy.

When a man comes to the sick bay with a case of venereal disease and is put under treatment, he is asked for the name and address of the girl from whom he believes he has contracted the disease. The suspect girl's name is passed on to the authorities ashore with the request that she be examined, and, if found infected, put under treatment.

This plan, wherever it can be worked out, serves to limit further spread of the disease. There are many port cities where the public-health officers work in co-operation with the Navy's medical officers. But in many instances local politics interfere with the functioning of this plan of prevention to the detriment of the civilian population as well as to the Navy.

For many years the problem of venereal-disease control seemed beyond our reach. In 1909, however, the Bureau of Medicine and Surgery adopted a prophylaxis devised by medical officers of the Navy. This was authorized for use on all ships, and the prophylactic—a calomel ointment put up in a small tube—was available to every man at any time—and with no questions asked. When a liberty party went ashore the men were encouraged to supply themselves with the Sani-tubes. The prophylaxis is effective only within six hours after exposure to infection; and more effective the sooner after exposure it is used. However, all men upon return to the ship or station after liberty are encouraged to report immediately at the prophylaxis station or sick bay for treatment. Almost immediately after the prophylaxis was instituted throughout the Navy, the rate of admissions to Navy hospitals for all venereal diseases began to show a marked decline.

There were some dissenting voices, however, against the use of the prophylactics. It was said that giving these to the men before they went ashore encouraged them in promiscuity. That, of course, was a matter of opinion. Essentially, what the Medical Department of the Navy is interested in is health; and it must be remembered that the use of the prophylactic has gone hand in hand with an educational program in self-control.

It was during a period when we medical officers were not giving out the prophylactics to the men when they went ashore, though the tubes were on sale at the ship's canteen, that the battleship on which I was chief medical officer cruised in the Mediterranean and put in at Villefranche. A day or two after our sailing for home a boatswain's mate came to the sick bay with gonorrhea. I sent for the man to have a talk. I reminded him that he was an old-timer, with an imposing row of hash marks on his sleeve, and that it was his duty to set an example to the younger men. I also reminded him—as he did not need to be reminded—that, according to Navy regulations, a man under treatment for venereal disease lost his pay for every day he was under treatment, and the fact had to be entered in his service record as a mark against him.

"Why," I concluded, "didn't you follow the advice which I have repeatedly given you and your men, to provide yourself with prophylactic measures before you went ashore?"

The man gave me a gloomy look.

"Well, sir, you know how it is. You go ashore with the best intentions. But these French girls have a way with them. And with a few drinks under your belt—— Well, you know yourself just how it is!"

Inevitably there always has been much discussion about imposing a penalty on men who contract a venereal disease. There are those who say that because a man knows he will lose his pay and be given a bad mark on his service record if he reports to the sick bay for a case of venereal infection keeps him from doing this; with the result that he either attempts to cure himself by using nostrums advertised for that purpose or goes to consult a civilian "specialist in venereal diseases" ashore, or merely neglects the matter and so possibly spreads infection among his crew mates. On the other hand, the men are fully instructed in the dangers of infection. They know they should avoid prostitutes and brothels. They know that the man who brings an infection back to his ship endangers not only himself but his crew mates and impairs the efficiency of the service. Undoubtedly there is a moral principle as well as a health principle involved. While we have the penalty it is urgent that the advertising of self cures should be outlawed and self-styled venereal-disease specialists should be carefully investigated by the civilian public-health authorities.

Meanwhile, there remains a problem which may be called the entertainment problem of the sailor ashore. The man who goes ashore is entitled to healthful relaxation and entertainment. He craves and needs feminine society. Every effort that can be made to supply him with these things in a healthful moral atmosphere —such as the U.S.O. is endeavoring to do—is a great factor in the Navy's program of preventive medicine and is certain to have its results in lowering the venereal-disease rate among men in the service.

As a matter of fact, the number of cases of venereal disease in the Navy is growing less every year. The statistics for the past ten years show a steadily and universally descending rate per thousand. It is still too soon for us to boast about it, but not too soon to prophesy that the Navy may be the leader in a great national program designed to eliminate venereal diseases, or at least reduce them to the minimum of other diseases which formerly attacked large numbers of our population.

We are out to get that 5 per cent!

A number of reasons have been put forward to explain why the rate of all venereal diseases in the Navy is steadily but surely going down. I am inclined to agree with that advanced by Rear Admiral Charles S. Stephenson (MC), former head of the Division of Preventive Medicine. Steve says, "I don't believe today's sailor is doing any less loving. I am inclined to believe he is demanding, and getting, a little better grade of loving."

## CHAPTER X

# Danger Under the Palms

ONE MORNING a message was received by radio at the Navy's Bureau of Medicine and Surgery, reporting the outbreak of a fever of undetermined type among the Navy's personnel on a certain island in the South Pacific. Immediately a telephone call was put through to the commanding officer of the Naval National Medical Center at Bethesda, Maryland, which is only a few miles outside the District of Columbia. By four o'clock that same afternoon a complete epidemiological unit consisting of a doctor specially trained in tropical diseases, members of the hospital corps skilled in laboratory technique, with all the equipment for a complete laboratory, left Washington by plane for that particular tropic isle in the South Pacific.

Within an incredibly short time after the call was received in Washington, the laboratory was being set up on the spot, and the study of the disease was instituted.

That prompt response to the call was in time and fitted to stop an epidemic which might have cost lives of fighting men, and, undoubtedly, would have cost fighting days and fighting strength.

Of course you may say this relief expedition was made possible by aviation. True. High-speed planes capable of carrying medical specialists and medical supplies halfway round the world in a few days give science the edge on disease. They make man very nearly as speedy as infection.

But what triumph there is in this particular achievement—and it is one which is being duplicated again and again as American forces move into new and further theaters of war where tropical diseases exist—must be divided fairly between the means of transportation of the relief and the scientific research, patiently continued through years, which have ultimately put those relief measures into our hands.

There is a story which perhaps doctors appreciate more keenly than their patients can about a man who complained to a famous surgeon that the bill for operating on his wife was too high. He demanded an itemized account. Accordingly, the surgeon wrote out:

| | |
|---|---|
| For performing operation | $ 1.00 |
| For knowing how | 999.00 |
| Total | $1,000.00 |

That seems to me a pretty fair estimate of the values inherent in doing a thing and in knowing how to do it.

I believe it was Goethe who observed that "no man walks with impunity under palms." Certainly the long story of man's adventures in the tropics is full of near escapes from death. However, to start with the most obvious interpretation of the poet's words, during my own many years in the tropics I was frequently impressed by the fact that though our lives were lived literally under coconut palms I never heard of a falling coconut hitting a human being. You would hear them thump on the ground occasionally, and you would think: "If that hit somebody . . ." But, as I say, it seemed as though dwellers in the tropics who are subjected to so many more insidious dangers at least are spared the danger of a knockout blow from above.

It interested me, and I began to question other medical officers who had served in the islands, hunting for a single case of a coconut casualty. I have never found but one. A medical friend who did a tour of duty in Guam reported the case of a native who took his siesta under a coconut palm, and as a result of this indiscretion and the trade wind was brought to the hospital with a fractured skull. But that case is sufficiently unusual to deserve remark.

The natives of Guam have a way of fishing in the surf with nets. They wade out into the breakers and throw out large hand nets to catch the small fish which are carried in on each wave. As the wave recedes, the men pull in the nets and pick out the fish, biting the heads off before throwing them over their shoulders into baskets strapped to their backs. One day a couple of Guamese fishermen appeared at the Naval Hospital carrying a third fisherman. A hasty examination showed that he was dead. An extra-lively fish had wiggled out of his hand as he attempted to bite off its head and lodged in his throat. As he and his companions tried to pull the fish out, the fins became embedded in the tissues, and he smothered.

Whenever a detachment of Marines or Navy personnel are stationed somewhere in the tropics, the men quickly discover the natives' sports and as quickly try to learn them. Rivalry runs high. The Pacific Islanders will round up their champion swimmers, surfboard riders, and canoers, and challenge the Americans to compete with them. Usually our men know better than to compete against any of the Polynesians in the water, and usually, too, they are frank in their admiration for the islanders' skill in aquatics. Wrestling and boxing, however, are a different matter.

All the Pacific Islanders have an adolescent admiration for a champion of the ring. A fellow big and powerful enough to knock another man down is immediately a hero in their eyes. In one of the islands of the Samoas, a big Polynesian who had done a turn with the French Army enjoyed a local reputation as a boxer which made him strut before the other natives and won him the adoration of the prettiest Samoan girls. There was nothing to interfere with his supremacy until our Marines came ashore. Then some of the girls began casting admiring and coquettish glances at the Americans, very much to the discomfiture of the native men. For a few days it looked as though there might be trouble. Then a committee of natives came round to the camp and produced their Goliath. They called on the Marines to send a David out to fight him.

The native champ was really a Goliath who tipped the scales at two hundred and fifteen pounds. And he had the killer's eye. Those who had seen him fight reported he didn't fight clean. And nobody felt anxious for a bout which could easily climax in a free-for-all and the start of an anti-American war.

But the honor of the United States Marines was at stake. They elected their David, a fellow who was a former boxing champion, though in the lightweight class.

The fight was arranged. Word of it rapidly spread by jungle telegraph to all parts of the island, and to other islands. From remote villages in the mountains of Tutuila, Opolu, and Savaii men and boys came wide-eyed to see the fight. Long, slender outrigger canoes brought spectators from even the furthest islets. The Louis-Baer fight drew a bigger crowd, but not a more intense and partisan one.

When the spectators squatted around the ring, many rows deep, until the dark, copper-colored bodies were lost in the shadows of the jungle, our men were hopelessly outnumbered.

"Our guy's gotta win," was the opinion expressed by his backers. Nobody liked to think what might happen if he didn't.

Someday, undoubtedly, the tale of that fight will be poetry and part of the rhymed folklore of Samoa. Native taletellers will recite the exploits of the smaller white man who pounded the big islander with a dexterity that outmatched the other's brute strength and flattened him on the ground eleven times before putting him away in the sixth round.

Awed small boys with distended "banana bellies" gathered around the panting champion. An island chief gave a feast in his honor and—as the Marines tell it—offered him his choice of his daughters in marriage and the right of succession to the chieftainship.

Tropic islands with beautiful Polynesian bathing girls lolling on the white sand, each with a hibiscus flower behind her ear, make an alluring travel poster calculated to fire all the wanderlust in a man's nature. If you have had much experience living in the tropics, however, you know that the palm shadows and the lush, green jungles that form the background of the picture of South Seas enchantment hold danger and possible death. For the hot, damp soil and the sluggish tropical streams are the fertile breeding ground of at least thirty varieties of mosquito and an undetermined host of other varieties of insects which seem destined to play the extraordinary role of spreading disease from man to man. Altogether, the victims of the tribe of *Anopheles* and of *Aëdes aegypti* (to mention only a select few of the winged dealers in death) are so many as—in a single year—to outnumber all the battle casualties of a global war.

It is not merely bullets, shells, and bombs that we have to give our fighting forces the means of resisting. It would be of small use to provide protection against these weapons if we did not at the same time supply some means of control of tropical disease and of its insect carriers.

The interest of the medical profession in this country in the study of tropical disease began during the Spanish-American War. Our operations in the Caribbean, in Panama, and in the Philippines spurred on researches into the origins and means of transmission of yellow fever, malaria, dengue, blackwater fever, yaws, and hookworm—diseases which occur principally in tropical climates. At that time we had no school of tropical medicine in this country. We had to send our medical officers to Britain to be educated in the problems of tropical disease. Within a few years, however, a school was established in the United States and became a leading center for teaching this specialty. The Medical Corps of the Army and of the Navy have produced a number of outstanding specialists in the field of tropical medicine. The name of Major Walter Reed leads them all for his conquest of yellow fever. The Navy is ably represented in this specialty, notably by Rear Admiral Edward R. Stitt, who is quoted freely in this chapter, and who has made most valuable contributions.

The ports of the West Indies, Central America, Rio, and the Gulf ports of the United States were all particular hotbeds of the "yellow jack." Vessels putting in at these ports suffered casualties among their crews which made skippers dread those ports of call. Before Walter Reed accomplished his great work in 1900, it was not known that yellow fever was transmitted by the species of mosquito known as *Aëdes aegypti*. Consequently, the preventive measures employed were generally useless.

In Marryat's *Peter Simple* an old quartermaster describes the disease to a young midshipman:

> With regard to Yellow Jack, as we calls the yellow fever, it's a devil incarnate, that's sartain—you're well and able to take your allowance in the morning, and dead as a herring 'fore night. First comes a bit of a headache—you goes to the doctor, who bleeds you like a pig—then you go out of your senses—then up comes the black vomit, and then it's all over with you, and you go to the land crabs, who pick your bones as clean and as white as a sea elephant's tooth.

One of the worst yellow-fever ports for many years was Pensacola, Florida, where we now have a large naval station, and where the excellent health rate is the best possible proof of the efficacy of modern preventive measures against the once-fatal yellow jack.

The same species of mosquito (*Aëdes aegypti*) which carries yellow fever from man to man is now known to be the carrier of dengue. This disease, which for years was confused with influenza, and later with malaria, is caused by a filtrable virus. It is often called "breakbone fever" because of the feeling you have when it attacks you—intense pains in the joints, especially those of the knees. Sometimes it is called "bouquet fever" from the eruptions which occur after the onset of the fever. The name dengue comes from the Spanish word for a dandy, *denguero,* which refers to the "dandified" gait produced by the acute muscular and joint pains.

Practically everybody who serves in the tropics goes through an attack of dengue. It doesn't kill you, but it renders you weak and useless for days and, therefore, a prey to other infections.

One of the most important fields now under research is that of the filtrable viruses. So far we know very little about them. We have, as yet, no adequate means of preventing their effects on the human being. Even exercising the greatest care in draining swamplands and pouring oil on mosquito-breeding waters, it is beyond the range of possibility to eliminate the carrier *Aëdes aegypti.* What lies within the range of possibility, and perhaps closer than many of us realized until recently, is that our researchers will discover an antitoxin which will counteract the effects of the filtrable viruses as our inoculations again typhoid build up an immunity to that once-devastating disease.

The conquest of yellow fever, however, is not yet complete. The vaccine in use against it is an effective preventive of the form of yellow fever commonly epidemic in the port cities. When voyagers confined their travels to cities they had only this urban form of yellow fever to combat. Within the last decade, as civilizations and armies have gone deeper into the jungle, a new type of the disease known as jungle yellow fever has been discovered. This is an especially virulent form of our old enemy yellow jack. It would seem that some of the jungle animals, notably monkeys, are reservoirs of the virus. The mosquito sucks the blood of the infected animal, becomes infected with the virus, and then injects this into man when it goes to him for a second meal.

One might say that the answer to these problems is a signboard, "No Trespassing," posted at the edge of the jungle. A convenient solution would be to let the jungle beasts, the mosquitoes, and the viruses destroy each other, and, eventually, themselves. Undoubtedly this sort of warfare, with the ultimate elimination of a disease, has happened time and again in the history of the human race. But with the acute world need of rubber, metals, and various drugs, chemicals, and medicinal plants, man is under the necessity of cutting roads for himself through the jungles. It is probable that for the next quarter century the foremost problem in medicine before the world will be that of the prevention of tropical disease.

Before you can hope to get rubber, valuable ores, and other commodities which the world needs acutely out of Africa and South America, you have to be able to keep the men who go into the jungles after these things not only alive but healthy and able to work.

As was anticipated, dengue and malaria are the principal health problems in the Southwest Pacific. Incidence of the dysentery infections also has been high.

Malaria is caused by a blood parasite, transmitted from man to man by the bite of thirty different species of mosquitoes which are found in most tropical and subtropical lands. It is interesting that Hawaii, Samoa, Fiji, Tahiti, and the Marquesas and Gilbert Islands—all in the Pacific—are malaria free. All the other islands in the South Pacific are badly infected with the malaria-carrying *Anopheles.* The mosquitoes usually do not travel more than a mile or so from their breeding places and homes; that is, on their own wings and under their own power. They are carried along the routes of the Trades by the prevailing winds, and it is well known that mosquitoes have been transported from island to island and across wide distances of water in the feathers of birds and in the holds of trading schooners.

Airplane travel has provided the *Anopheles* and *Aëdes aegypti* with rapid transit. It is readily seen how easily a mosquito can get into a plane on a landing field somewhere in the tropics and travel comfortably three or five thousand miles. If it is a mosquito which has already fed on the blood of a malaria-infected person, the insect is a danger to every other passenger in the plane as well as to the residents of the country where she disembarks, hungry from her travels, and sets up a new home. There is a species—*Anopheles gambiae*—which made its home in West Africa, from the Sahara to the Zambezi. It was not known in the Western Hemisphere until about ten years ago, when it suddenly appeared in Natal, Brazil, where its presence was followed by an epidemic of malaria of unusual virulence. Scientists of the Rockefeller Foundation, who studied the Natal epidemic, gave *Anopheles gambiae* a very bad name. It seemed probable that the insects had come to Natal from Dakar. An air route between the two ports had just been opened. The Brazilian Government and the Rockefeller Foundation have co-operated in efforts to eradicate *Anopheles gambiae* from Natal.

To produce an epidemic of malaria anywhere in the world, three factors are necessary: first, individuals with the malaria parasite in their blood streams; second, *Anopheles* to bite these individuals; third, a sustained mean temperature above 60° F. which maintains the infected *Anopheles* comfortably while they bite several more malarial prospects, thereby spreading the virus.

The Scotch army surgeon, Ronald Ross, and the Italian doctor, Giovanni Grassi, working independently and jealously of each other, proved to the world the part the mosquito plays in transmitting malaria.

The mosquito had been under suspicion for years. Everywhere east of Suez the mosquito net is as important a part of the bed furniture as the "Dutch wife"—that plump sausage of wicker that gives you something cool to lie against under your carefully lowered bridal mosquito netting.

I remember being in Bangkok and having the hotel servants come to where we were sitting on the terrace, watching the sunset, to bring us multicolored mosquito-netting bags into which they tied our feet and legs. At formal dinner parties in Siam and Burma a netting bag for the guest's feet and legs is laid with a napkin at each place, along with individual bottles of citronella to anoint hands, face, and neck before dining.

It has long been known that the mosquito likes a shaded and preferably dark surface to rest on during the day. Accordingly, in the tropics, house walls are painted white to discourage insects from resting on them. And as soon as dusk falls the houses are closed as tight as possible. In many localities, for centuries, malaria was supposed to result from breathing the reputedly dangerous night air. Hence the name. Newcomers were cautioned against leaving windows open after dark. The warning was sound, but it was not the air but the mosquitoes that were required to be shut out.

Several forms of mosquito-controlling lotions are now issued to our men in the tropics, to rub on their bodies and clothing to ward off the *Anopheles* and their relatives. One of the best of these is colorless and scentless. At least scentless to the human nose. Apparently the mosquito is fitted with keener olfactory nerves than man possesses, for the lotion discourages him from biting any portion of the anatomy anointed with it.

Strict precautions as to field sanitation and mosquito control are instituted wherever we have men stationed. Swamps are drained. Sluggish streams are sprayed with heavy oil. A vigilant patrol is kept up to see that no receptacles or low spots gather water in which mosquitoes can breed.

But in war, with men constantly on the move into new territory and territory in which the enemy has been living and from which he has retreated—though leaving his disease-infected mosquitoes behind him—the only possible safeguard against the insect-borne tropical diseases is a drug like quinine, which successfully counteracts them.

No one knows how long ago the Indians of Peru discovered the virtues in the bark of the cinchona tree as a cure for malaria. The drug was introduced into Europe in the first half of the seventeenth century and included in Linnaeus' *Species Plantarum.* However, quinine was not used in the practice of medicine until 1820.

The British Army in India has had long experience with the use of quinine, as India is probably the most malaria-ridden country on the globe. One out of every three persons in the country has the disease annually. It is estimated that more than 3,000,000 persons die from its effects each year. It has long been a practice, begun by the British and continued by our Medical Corps, to give troops and sailors engaged in the tropics a daily dose of quinine as a preventive. The drug has several unpleasant effects, and quite naturally many of the men object to taking it, especially if they have never suffered the ague and therefore have no idea what the dose is saving them from.

One of our medical officers, serving with the Marines in Panama, found that the men were not swallowing the capsules of quinine when these were handed out to them. Instead, they maneuvered the capsule into place between the teeth and the cheek and left it there until they could conveniently spit it out. My friend got around this by ordering the men to be lined up for the daily dose and requiring each man, on taking the capsule in his mouth, to whistle. A good, clear whistle was incontrovertible proof that the capsule had been swallowed.

Quinine, which originally came from South America, was grown extensively in the Dutch East Indies. The plantations on those islands were the chief source of the world's quinine supply. When the Japs conquered the East Indies, they robbed us not only of our rubber but of our malaria preventive. The average home-staying citizen felt the deprivation of his share of rubber, but probably passed over without remark the fact that Tojo had cornered quinine.

To the medical services of the Army and the Navy the acute shortage of quinine presented a serious problem—though not quite so serious as the Axis partners believed and doubtless hoped it would be to us, for we already had atabrine, a synthetic quinine created by German chemists in 1932.

In line with our medical preparedness program for the inevitable war with Japan, some of the results of which at Pearl Harbor have been told, we secured from Germany the secret of making atabrine. Some time was required to perfect its manufacture in this country with available American materials. This was accomplished in 1939, and Japan's raid on Pearl Harbor—though it caught us with our pants down—found us with our supply closets well stocked with atabrine to make up for the shortage of quinine.

It is still too soon to say if atabrine can take the place of quinine as a malaria preventive in prolonged campaigns in the tropics. Atabrine suppresses clinical symptoms; it does not prevent or destroy infection. Much has been claimed for it—as happens with every new drug discovery. Experience makes one cautious about all cure-alls. But if atabrine holds off malaria from our men in the Solomons—where the disease has always been endemic in an especially virulent form—it will have proved its worth and won a place of honor in the annals of medicine.

Cases of relapsing fever, which is frequently confused with malaria, and of blackwater fever, are common in all the tropics and have to be guarded against where our men are stationed in so-called malaria country. Blackwater fever is endemic in certain parts of Africa.

After malaria, the most serious medical problem in landing troops in the tropical parts of West Africa is presented by sleeping sickness, which is transmitted from man to man by the bite of the tsetse fly. Sleeping sickness has been endemic along the Guinea Coast for centuries. A British naval surgeon described the disease when his ship visited ports of West Africa more than two hundred years ago. There is no doubt that the disease has seriously interfered with the development of all the country from Dakar to the Congo River. It is known that the tsetse flies will travel in the hoods of cars, in motorcycles, and on the backs of pedestrians, and so are carried for many miles, spreading the disease. Whenever there is an epidemic of sleeping sickness, the authorities establish traffic control and quarantine along the roads. Frequently screened tollgates are set up in which vehicles are searched for tsetse flies and the flies, if found, are killed. It is a clumsy and not very effective method of disease prevention.

Today, with the opening up of the coast of tropical West Africa, with the cutting of roads through jungles, and the establishing of airplane routes and landing fields throughout the heretofore Dark Continent, our medical officers are challenged to find the means of rendering the bite of the tsetse fly and of the malaria-carrying mosquitoes innocuous. It is a matter of pride that we can report that the landing fields on the air-supply routes across Africa already have been made practically malaria free.

After all, it seems likely that the reason why many of these tropical diseases have persisted through the years is that man has not seen the necessity of putting money and effort into the suppression of them. It is not too much to suppose that the war we are now engaged in will focus so much attention on malaria and other tropical diseases that society will gladly assume the cost of their eradication.

# Hunting for Answers

IT HAS sometimes been suggested that war has its compensations in that great medical discoveries result from the conditions and tragedies it brings. As a matter of historical record, this is not the case. The greatest advances in medicine have all been made during periods of peace. Research and experiment are long, complicated, and arduous—impossible in the confusion, haste, and constant change incidental to war. What is true, however, is that the emergencies produced by war incite research and experiment which are continued through the peace that follows. Then, too, the very emergency which places surgeons and doctors in remote places of the world, without the medical supplies and the equipment they are familiar with, frequently stimulates them to discover substitutes and makeshifts. War's necessity is the mother of a good many inventions.

Take, to begin with, the subject of blood transfusions. During World War I Dr. O. H. Robertson, an American working with the British forces, for the first time used preserved blood on the battlefield. This experiment carried on under fire led to the establishment of blood banks and made possible the relief measures being employed so successfully in our Army and Navy today.

Whole-blood transfusion had been a subject of discussion for centuries, and particularly so since Harvey published his discovery of the circulation of the blood in 1628. Animal blood was used with disastrous results, but finally someone had the temerity to attempt a direct transfusion from one human to another.

These first transfusions were very frequently followed by severe reactions or death of the recipient. The discovery that individuals had different "types" of blood corrected this. At the same time many diseases, such as syphilis and malaria, were transmitted. These accidents are now rendered impossible by proper laboratory tests.

Blood banks were quite popular during the last war, the blood being prevented from clotting by a solution of sodium citrate. This made it possible to transport blood to the front lines.

At the beginning of this global war blood banks—meaning whole blood—were much in evidence. Experience showed, however, that much valuable blood was lost by improper preparation, infection, and rapid deterioration, one to three weeks being the limit of safety.

The recent rapid advances in processing whole blood to get rid of the cells have provided blood substitutes—plasma, dried plasma, serum albumin—which have made transfusion—or infusion—a safer and more practical and universal procedure.

Today, not only are our hospital corpsmen equipped with dried plasma to inject immediately into the wounded, but we have devised containers which are filled with plasma and the equipment for injecting it with directions how to do this. These containers can be dropped from planes to men on the deserts or in remote, inaccessible spots in the mountains. They can be dropped onto rafts floating on the sea, giving men the much-needed relief which will keep them alive until rescue is possible.

One spectacular feature of the present war is the emergence of aviation from the experimental stage to foremost place as a form of combat. To escape detection and avoid damage from both ground and aerial defenses, the heavy artillery of the air is now being flown at higher and higher levels. This means beyond the range of fighter planes, as these are now constructed and equipped.

Only in so far as the bomber alone is able to operate at extreme elevation is it immune from attack. The obvious countermeasure is to turn out pursuit planes equipped to operate at levels above those attainable by the enemy's bombers. In this seesaw struggle for altitude, the problem becomes a medical and not an engineering one, as the aviator—the physiologic mechanism—is the chief factor conditioning success.

Much research has been directed to selecting personnel resistant to hypoxia, to measures for increasing tolerance for altitude, to sources of oxygen and to supplying this to the aviator readily and at the extremely low temperatures of the upper strata. Unfortunately, supplying pure oxygen is not a wholly adequate measure. Above 44,000 feet life can be maintained only by supplying another element of normal environment—namely, atmospheric pressure. This is a task for the engineer, the pilot, and the physician, working in collaboration on the development of pressure breathing apparatus, pressurized suits, and pressurized cabins. Today it is one of the most important fields of research in which the Navy's specialists are engaged.

What is wanted also, and what we are working on, is a mask for aviators which shall have a seal fit, be comfortable, be ventilated, permit full vision, supply oxygen, and contain a microphone.

When a dive-bomber, hurtling downward at a speed of 400 to 600 miles per hour, reaches the low point of his descent and noses sharply upward, plane and man are subjected to a terrific strain. For several seconds the pilot may weigh 1,000 pounds or more. Under the pull, hernial protrusions break out, veins rupture, and backs are wrenched. The blood, heavy as molten lead, gravitates toward the extremities, and the entire vasomotor system is thrown out of balance. Circulation is arrested and the aviator experiences a black-out.

A great deal of research is now going into the development of devices which will fortify the pilot against black-out. By means of automatically operated pumps and valves, serving a specially constructed suit which encloses the body and lower extremities, it has been found possible to create external supporting pressures, proportional to the G-stress but graduated in degree from the lower extremities upward. In order to maintain circulation during the dive, the suit is equipped with an arrangement for feeding oscillating pressure in such fashion as to massage the limbs.

Another invention in the way of aviators' clothing is the electrically heated suit. Wearing one of these, our pilots can fly in an open cabin plane, in an atmospheric temperature of 90° F. below zero.

Our eye specialists have been working for some time on the problems of dark adaptation, which is the power to adapt, rapidly and perfectly, to low visibility. It is extremely important that submarine lookouts, men going on night watch, and night raiders shall be able to do this. Because the light rays prevailing at night lie near the blue end of the spectrum, the color of illuminant used in compartments is pure red. This preserves the full sensitivity of the eye to blue, just as if the compartment were in complete darkness. Following the same principle, red goggles are worn. These permit the man to move about and read by ordinary illumination, yet when he goes out into the night he enjoys the maximum possible vision in three minutes instead of the thirty which would otherwise be required for his eyes to adapt to the dark.

Normal people differ somewhat in their power of dark adaptation. Good dark adaptation is not necessarily accompanied by good night vision, since other factors influence it. Night vision can be greatly improved by training and practice. Blindfold drills assist men in the performance of night duties without lights. The pilot develops a tactile familiarity with his controls. The same training is given lookouts, gunners, and torpedo men for night duties aboard ship. Lookouts are taught how to see. For example, a dimly illuminated ship, airplane, or other object cannot be seen if one looks directly at it. Looking slightly away, however, will throw the image on the more sensitive portion of the retina, where it will be more easily picked up.

It takes practice to learn to do this, but it is essential in lookout technique. We found, too, that the eyes are more sensitive just after being moved. Lookouts are trained to move the eyes frequently while in dim light. They are instructed to move them in short jumps, to search the sky or horizon systematically, and be on the lookout for objects in the corners of the eyes.

Since night vision is wholly dependent on contrast, anything which produces contrast seriously impairs it. The Navy's researchers are working on means of protecting the night observer from loss of adaptation through exposure to uncontrollable sources of light—exploding shells, discharges of guns, tracer bullets, the dazzle of searchlights, and even illuminated instrument panels. For military reasons I cannot go further into this matter.

Decompression sickness is a modern name for the disorder long known as caisson disease. The aeroembolism which the aviator suffers in rising from sea levels to high altitudes is the same as the "bends" experienced by the diver in rising from depths to the surface. The bubbles which form in the blood obstruct circulation, perhaps in vital organs. Research has discovered no preventive of this condition, but something is being done in the way of testing personnel and grounding those who are susceptible to pre-embolic changes. We are also at work on finding means of eliminating the nitrogen from the body by pre-oxygenation.

During World War I the submarine established itself as an essential arm of sea power. However, it was quickly perceived that here was another instance in which the range of operations is limited, as with the airplane, by the requirements of human physiology. Picture the conditions on an undersea craft in the tropics—the men are crowded excessively, the temperature inside the submarine is uncomfortably high, the humidity is extreme, there is only canned food to eat. And these conditions are maintained for ten weeks, perhaps, of anxious days and sleepless nights. Not once do the men get a glimpse of the sun. I was once asked by the captain of a submarine to make out an appetizing diet for his crew. The best I could do was one line on a prescription blank:

℞ Get a good cook!

To these physical discomforts must be added the effects of an abnormal mode of life and of constant strain. The submarine is the hunted as often as it is the hunter. It is the object of relentless search by surface craft, planes, and other submarines. All about are listening devices to detect the slightest sound which might betray its presence to the enemy. Moreover, being systematically depth-bombed is not the less harrowing for being a daily experience.

Under these conditions morale sags. But to the credit of our men, be it said, nothing revitalizes a tired crew like a successful offensive. Sinking an enemy ship does more for a crew than a ton of vitamins.

As a matter of fact, the problem of keeping submarine crews healthy depends on providing air conditioning, alleviating the complex we call fatigue, and making up for the loss of salt and water-soluble vitamins eliminated in the sweat.

The sinking of the submarine U.S. *S-4* in 1927 after collision with the Coast-Guard destroyer *Paulding,* off the tip of Cape Cod, with the loss of all aboard, directed research in the direction of developing safety devices for submarine escape. A steel chamber weighing eight tons, for collective submarine rescue, and a rubber "lung" containing a soda-lime canister into which the individual breathes through a mouthpiece during an ascent were developed. Thereafter, all submarine personnel have been given intensive training in the use of the "lung." Escape drill became standard practice. Training tanks one hundred feet high were constructed at two of our submarine bases and the *S-4,* which was salvaged, was put to use as an experimental ship from which men were trained to ascend to the surface on a buoy line, after having filled the escape appliance with oxygen. Today every submarine is manned by a crew of men whose morale has been strengthened by the fact that they have been trained how to escape from disabled sunken craft.

The value of this training was demonstrated in 1939 when the U.S.S. *Squalus* went down off Portsmouth, New Hampshire. When news of the disaster reached Washington, the experimental diving unit from the Navy Yard of Washington, D.C., left by airplane and immediately began preparations to rescue survivors of the disaster. Because of the depth of the water and the low temperature it was decided that rescue should be effected by means of the chamber which protected men both from the sea and the abnormal pressure. Fortunately, Commander A. R. McCann, United States Navy, who had devised the submarine chamber, was present for the rescue. Working with him, and in charge of divers, was Lieutenant Commander C. B. Monsen, who had helped develop the submarine "lung." The researchers were on hand to make the first real emergency test of their inventions.

The thirty-three survivors of the disaster, submerged two hundred and forty feet in a water bath at a low temperature, suffered acutely from the cold and from the increased concentration of carbon dioxide within the submarine. As Lieutenant Oliver Naquin, commanding officer of the *Squalus,* reported later: "Every effort was made to conserve the energy of the men, who spent a great deal of time sleeping. They were instructed to remain calm, as excitement would increase oxygen consumption and carbon dioxide output. Except for the men engaged in communication with surface vessels, by tapping signals, there was no activity on the part of any of the survivors, who remained in the same positions throughout the period of twenty-eight to forty hours prior to rescue. The atmosphere in the submarine was dark, cold, and moist. The men suffered acutely from cold, which was only partially relieved by eating. The emergency ration of beans was eaten by only a few men, and in small quantities. They preferred the canned pineapple, tomatoes, and peaches which were available in the commissary storeroom. Fluids were derived entirely from the canned foods as the fresh-water supply had an unpleasant taste."

But discipline was excellent and the morale high. The survivors, in contrast with the personnel on the *S-4,* felt assured, on the basis of repeated training drills, that they would be rescued. One or two men who previously, in good-natured Navy fashion, had tended to deprecate the value of escape training, now took a great interest in the facilities for rescue. About thirty hours after the *Squalus* sank, the first group of survivors was brought to the surface in the rescue chamber. The men appeared calm and relaxed. They were shivering with cold and complained of headache, undoubtedly caused by the increased concentration of carbon dioxide. Within a few hours, however, they were in good condition and ready for transportation to the Naval Hospital at Portsmouth. No cases of pneumonia developed. Only one of the thirty-three men exhibited symptoms of infection of the upper portion of the respiratory tract.

So much for the value of research.

In the Navy we are constantly faced by the necessity of repairing docks and salvaging sunken ships. This requires deep-sea diving, for, in addition to manipulating heavy chains and pontoons, as many as thirty to forty air hoses must be connected between the surface vessel and various couplings on the pontoons and deck of the sunken craft. When salvage operations were begun on the *Squalus,* the deep-sea divers were supplied with air. Diving in semi-darkness to a depth of two hundred and forty feet to attach the air hoses to the deck connections proved to be dangerous. The nitrogen in the blood, acting as a narcotic, produced loss of consciousness. Some research into the use of helium-oxygen mixtures for use in deep-sea diving solved the problem and resulted in the salvage of the *Squalus*. However, on one occasion, before a satisfactory method of recirculating the gases had been discovered, one diver had asphyxial symptoms at the depth of two hundred and forty feet and "blew" to the surface. The problem was solved at the Harvard School of Public Health when a medical officer and one of the divers, working with several of the personnel of the school, ascertained the cause of the trouble and made the necessary adjustments which have given us practically foolproof means of keeping divers alive and in good condition at great depths.

After working fifteen to twenty minutes at depths of two hundred and twenty to two hundred and forty feet, a diver is brought to the surface in fifteen minutes, stopping only at the eighty-, sixty-, and fifty-foot levels. He is then taken to the recompression chamber, where oxygen is administered for forty-five minutes or longer. After this procedure, it is safe for the man to return to normal atmospheric pressure. The success of this method is shown by the fact that from six hundred and twenty-eight dives only two cases of "bends" were observed. In connection with the research being done on deep diving, Commander A. R. Behnke (MC) has made essential contributions which have lessened the dangers to divers from "bends."

Another danger to the diver is the temperature of the water. Divers, breathing and surrounded by a helium atmosphere in which the thermal conductivity is much greater than it is in air, are especially subject to cold. To counteract this effect, we have devised fireproof, electrically heated garments. The heat supply comes from storage batteries easily controlled by switches in response to telephone communication with the diver. Using these means, men are able to work more than two hundred feet under the sea in a comfortable environment at least as far as temperature goes.

Defense against chemical warfare is the subject of active investigation here and abroad. However, nothing can be reported at this time as to accomplishments in this field. For the same reason, disclosures regarding biological warfare must be withheld. Nevertheless, it may be said that our research agencies are on the alert to provide protection to our country from these inhuman weapons.

War at sea produces its own peculiar fatalities; and modern warfare has produced problems for medical science which challenge all that science has achieved since World War I. Foremost among these new problems is that of immersion-blast injuries inflicted on men in the water by explosions which may occur fifty to one hundred and fifty feet away from them. This is giving us more concern than any other problem we have in the Navy. When a destroyer goes down at sea, she goes fast. The men are left in the water fairly close to her. The depth charges which are always there ready to be thrown on the enemy will explode when they reach a certain depth. There is no way known to prevent this. When it occurs, terrible things happen to the men who are in the water swimming about their torpedoed ship.

There were a great many of these casualties at Dunkerque, and we suffered a number at the Battle of Midway. "The damage," says Captain J. J. M. McMullin (MC), United States Navy, who has conducted much research in immersion-blast injuries, "may be slight or severe, depending upon the intensity and proximity of the blast waves. It seems probable that pulmonary lesions are the lethal factors."

As the result of study of immersion-blast injuries, a life jacket made of kapok, or some other buoyant material, which protects the anterior chest and the entire abdomen has been devised and is being put to use. Men are instructed to swim on their backs if the abdomen is not adequately protected. It has been found that men who have their backs toward the blast, or who are swimming on their backs, suffer lung rather than abdominal injury. One survivor told of two shipmates swimming near him. An underwater blast, about one hundred and fifty feet distant, occurred as one of the men was climbing into a raft with his comrade a few yards behind him, swimming in a prone position. The former was unhurt; the other instantly killed. The patient who told the story said he had turned over on his back to rest for a few moments when the explosion came. His injuries were not serious. Experimental studies of the effect of immersion blasts on animals are going on at a number of our naval hospitals and at the Naval Medical Research Institute.

Men who have been shipwrecked and forced to spend many days on rafts or in open boats, exposed to cold and wet, frequently develop a condition of the feet and legs known as immersion foot. This is extremely painful. The sufferers may be crippled for weeks or, in certain cases, lose their feet from gangrene. Study of this condition has developed a special first-aid treatment in which hospital corpsmen and others are instructed. Sufferers from immersion foot should not be allowed to stand or walk; the legs and feet should not be rubbed or massaged, nor should heat be applied to the extremities. Legs and feet should be wrapped in clean, soft strips of sheets and laid on pillows. The patient should be kept warm and given morphia.

Shock still remains a major problem among war casualties and offers a field for extensive research. The use of blood plasma and of human albumin plays a great part in combating shock. We are now supplying human albumin to ships at sea.

Experiments in the use of bovine albumin as a shock preventive are now engaging the attention of many research workers. The final step in the process of preparing this for use in saving human lives will be completed before long.

Fatigue which lessens efficiency, impairs vision, causes accidents, lowers morale, and produces innumerable neuroses is an acute problem in every branch of the fighting services. Actually, we know very little about fatigue and how to prevent it. Research into methods of detecting the first revealing symptoms of fatigue is going on in a number of schools, in order that men who show these symptoms can be taken from active duty whenever possible and given rest periods. Many of the weapons of modern war—

notably the airplane, the submarine, and the tank—are exhausting to the men who operate them. The same is true of the motor torpedo boats of light construction and capable of very high speeds. It is not sufficient to have developed these rapid and dangerous machines of war without developing, simultaneously, the means of making them less hazardous to those who operate them than to the enemy. As long as engineering and invention go on, there is constant demand for medical research to keep pace with them. To quote Rear Admiral H. W. Smith (MC), United States Navy, who is chief of the Research Division of the Navy's Bureau of Medicine and Surgery, "Under the biting stimulus of a struggle for survival, research in both the science and the art of medicine is being speeded up at a pace hitherto unknown to us."

Working in close co-operation with the National Research Council, our Research Division is able to carry on experiments in more than eighty universities and laboratories. Hundreds of contracts for projects, vitally important to the armed services, have been let out through the Committee on Medical Research of the National Research Council. In practically every university in the country and in every great medical center and laboratory research is going on into problems concerned with the well-being of the Navy's men. Nor is any discovery made in the field of medicine and surgery that is not promptly reported to our Bureau of Medicine and Surgery and passed on, immediately, to doctors and surgeons in the field.

When a doctor or a chemist invents a new gauze dressing, pretreated with one of the sulfa drugs, or a cellophane cover for a wound which permits it to be observed without changing the dressing, or discovers a new use for a certain drug, invents a splint that has the advantage over others of being easier to apply, a light stretcher made of bamboo and canvas, or any surgical instrument which saves time in an operation, these are immediately put to test by our medical officers and reported on.

If the reports are commendatory, recommendation of these devices is made to all medical officers by the Bureau of Medicine and Surgery.

In addition to these products of laboratory research, hundreds of discoveries and inventions made by private individuals are brought annually to our Research Division. All these, no less than the painstaking, scientific work of chemists, bacteriologists, pathologists, and medical specialists, are proofs that the American people feel that the Navy and its men belong to them, and want to do their utmost to safeguard those men in their important task. Admiral Smith—"Scientific" Smith as we in the service call him—receives with an open mind the letter of a lady from New Hampshire urging the use of slippery elm to cure sailors of sore throat; the visit of a Ph.D., who urges further uses of sulfa drugs; the description and blueprint of a homemade splint; and the formula for a remedy which, a Nebraska farm woman writes, keeps her turkeys healthy in cold, wet weather and so she believes will be valuable as a medicine in the Navy.

CHAPTER XII

# Solomons' Wisdom

EASTWARD of Australia lies the Coral Sea, ringed round by thousands of green atolls. Swarms of native craft ply between these islands, carrying on a commerce that, until the present war, had changed very little since the fleets of Portugal and Spain found their way there in search of spices and pearls. Through the long, hot nights turbaned crews squat cross-legged below the furled sails of the island boats. They chew betel nuts and let the red juice dribble down their chins while they talk. The stories they tell are of ships that have sailed the Coral Sea—legendary ships, many of them—manned by sailor warriors whose exploits are celebrated in songs sung in all the native settlements from New Guinea to New Zealand.

There is no counting the new legends that have been made and will continue to grow out of the fighting in and around the Solomon Islands.

From the days when the Japanese began their push southward toward Australia, the Navy had been fighting the invaders in the Coral Sea. Until the Marines made their first landings on Tulagi and Guadalcanal and captured the all-important Henderson Field, the struggle was all at sea. Those smooth, glistening waters were the scene of Homeric battles in which cruisers, airplane carriers, destroyers, and submarines played their parts. So one of the last remaining portions of the globe, little touched by modern civilization, became the theater of highly mechanized modern warfare.

In the course of engagements covering nearly a year, more than one Navy raft, with shipwrecked men clinging to it, was washed up on the shore of some coral island, inhabited only by dark-skinned natives whose attitude toward the white man was a matter of speculation.

Very early in the morning after the battle of Savo Island, on November 13, 1942, one of the American light cruisers which had taken a torpedo hit during the night's battle was proceeding, with other ships of the cruiser-destroyer fleet, through the Coral Sea. Suddenly—and inexplicably to most of the men aboard her—there was a terrific explosion amidships, which sent a geyser of fuel oil high into the air to fall back on the deck, blinding, choking, and stifling the men stationed there, covering their bodies—and the sea for a radius of many yards—with a thick, gummy coating. What had happened was that the cruiser had been struck by a torpedo loosed from a lurking enemy sub. This hit, which was exactly opposite the hole received during the battle, literally broke the cruiser's back.

A young lieutenant, whose leg was fractured by a piece snapped from the mainmast, came to some minutes later to find himself in the water. When his head came up out of the sea, he found himself under a cargo net to which a number of other survivors were clinging.

As he told it: "It was very dark, and I couldn't see much. Finally I got some of the oil wiped out of my eyes. The ship was gone, and the rest of the ships of our task force were heading away from us at full speed. 'Aren't they going to pick us up?' one of the men asked me. I explained that they had to get out of the danger area. They couldn't risk the ships and more lives for a few hundred survivors of our cruiser. I said they would probably send a ship back for us later."

The men clinging to the cargo net attracted the attention of some men on two rafts. There were two other officers from the lost cruiser among them. They got the rafts together and stretched the net between them. The wounded were placed in the middle of the rafts.

"My leg was bleeding," the lieutenant said, "and the motion of the raft made it hurt, so I straddled a piece of timber and let my leg hang down in the water. It felt better that way. We hadn't any hope of being rescued that night, so we made ourselves as comfortable as we could, huddling together for warmth. It's funny in the tropics: blistering hot in the daytime, but once the sun goes down it gets awfully cold.

"The next morning some planes came over. They were ours, all right. One of them circled us and dropped some stuff, but we lost it in the sea. All this time we could see an island off on the horizon. It looked to be about forty miles away, and we figured it was San Cristobal, which is one of the southernmost of the Solomons group. We decided to try to make it. We were without water or food, and we had only improvised paddles. Those who could swim had to try to help the rafts along. Forty miles is a long way to go like that.

"Things began to get pretty hazy for me. I was going out of my head every now and then because of my leg and the heat and lack of food and water. Still, I remember the next morning another plane came over and dropped a rubber boat. One of our fellows got it and brought it to the raft. They put me in it with two boys to paddle and we started for San Cristobal to send back help to the rest.

"I must have been out of my head," he added, "or I wouldn't have let them do it."

As a matter of fact, the lieutenant was in worse shape than anyone else in the party. His leg was swollen up to twice the normal size, and he was delirious most of the time.

"Anyway, we started out. I was sitting on the stern thwart with my leg sticking out in front of me. The two boys were on the forward thwart, paddling. We had a container of water in the boat, but the salt water and the oil had gotten into it and it was pretty foul. We allowed ourselves three drinks a day apiece. My one hope was that we'd make the island before the water gave out.

"I was getting pretty wacky and I began to have the damnedest nightmares. Sometimes I dreamed the sharks were tipping over the boat to get at us, and I'd try to beat them off. Sometimes there really were sharks. The boys beat them off with the paddles.

"The fellows couldn't row all the time, of course, and it didn't seem as though we were getting any nearer to the island. On the second day I got the tides figured out. After that the boys just rowed when the tide was running our way. Then we put out a sea anchor in hopes we wouldn't drift back too far while the tide was against us. In the night I did a little crude navigation by the stars and explained to the boys what we had to do to make land. I figured San Cristobal was about ten miles away by then. That was the way the days went. The boys would paddle several hours and then rest. We'd each take a drink in the morning, another at noon, and another at night. The heat was the worst thing we had to contend with. And we didn't have any food.

"We were within five or six miles of the island when suddenly we saw a Navy flying boat. The pilot spotted us, and he came down and circled real low. He dropped some smoke pots in the water and it looked as though he was getting ready to land.

"Then all of a sudden a terrible storm came up out of nowhere. Those things happen fast in the tropics, but this was the fastest I ever saw. In just a minute it seemed the plane was blotted out and the island too. We had to start fighting for our lives. Those two boys did the finest bit of seamanship I've ever seen, keeping that boat from swamping."

The storm, which apparently had the demonic intensity storms often have in those parts of the Pacific, especially during the monsoon season, lasted nine hours. It whipped up the sea into waves thirty or forty feet high. It took desperate courage and work to keep the rubber boat afloat. The men told of seeing the lieutenant bailing and wondered how he could do it in his condition.

"Fortunately for us, the storm was moving toward the island and took us along with it. But for that we would never have made it. One enormous wave picked up the boat and tossed us right on a reef, not far from the beach.

"It was night, so we lay there for several hours, catching our breaths and figuring what to do next. Then the tide started coming in. Both boys were barefooted, so one of them put on my shoes and, taking a line, towed the boat across the lagoon and high up on the sandy beach. Then we all went to sleep.

"When I woke up, soon after daybreak, the boys were gone. There was a naked native standing there, staring at me the way I guess Friday stared at Robinson Crusoe. Then some more natives came out of the bush and gathered around, pointing at me and the rubber boat and chattering excitedly. I couldn't tell if they were friendly or not, but I kept pointing to my mouth. One of them grinned and ran off and brought me a fresh coconut, from which I drank some milk. I never knew anything that tasted so good.

"About that time the boys came back with fresh water. They had found a settlement back in the jungle that had been a Catholic mission. The missionary wasn't there, but he had taught some of the natives to speak English. We were able to make them understand who we were and asked them to help.

"I lay down in the rubber boat and they carried me through the jungle to the mission. One of the young natives, who spoke pretty fair English, said there was a white planter living on the next island and he would take word to him. I wrote out a message, and the boy went off with it. After I'd sent it I got to thinking: suppose that white man is a German, or friendly to the Japs. The natives wouldn't have known. I could see I'd taken a terrible chance. . . .

"We spent the night there with the islanders. They were friendly, gave us food, and mats to sleep on. Early next morning the planter's son came over from Santa Anna Island, and any fears were at an end. He was one of us, all right. He brought bandages, sulfanilamide, and brandy. He fixed me up the best he could. Then he took us in his boat to Santa Anna, where we could be well taken care of. The planter said he would get word to our Navy that we were there. Early next morning we heard a plane circling and our two boys ran down to the beach. They signaled it with a mirror and it came in close to shore, landed, and took us off. It was just eight days since our cruiser was sunk."

The convenient presence of the Santa Anna trader's son, with valuable medical supplies in his possession, reads like a bit of a fiction writer's invention, unless one knows something about the plans for medical service in that vast territory of Oceania which the governments of New Zealand and some of the islands, aided by the Rockefeller Foundation, had established in 1929.

It was in that year that the Central Medical School for the training of native medical practitioners was established at Suva in Fiji. The governments of American Samoa, New Zealand Samoa, Fiji, Tonga, the Solomon Islands, Cook Island, and one of the French islands aided in the support of the school and had the privilege of sending students who were trained in medicine and surgery. These young men who ranged in color from the golden-brown Polynesians through all the darker shades of the Melanesians (the natives of islands west of the Samoas) to the blue-black Solomon Islanders, went back to their own tribes wearing their tribal dress plus a coat which was the badge of their profession and a mark of caste. The coat was to these native doctors what the Vandyke beard and the top hat were to the physician of fifty and more years ago.

The Medical School at Suva has been called, and rightly, unique in the world's educational institutions. It is, in its way, a United Nations' effort in the South Pacific, one in which Americans, British, New Zealanders, and Australians assume an interest and a responsibility. Until 1939 the head of the school and its most ardent promoter was Dr. S. M. Lambert, then working for the Rockefeller Foundation.

During his many years' service for the Foundation in New

Guinea and the smaller islands around the Coral Sea, Dr. Lambert came to know and therefore to influence a great number of British, Australian, and New Zealand traders and planters, who lived on remote copra and coconut plantations in the islands. In his fascinating book, *A Yankee Doctor in Paradise,* he tells of his visit to Santa Anna Island, where he was a guest of Trader Kuper and his native wife. The trader's son Geoffrey was graduated from the Central Medical School in 1938. The city of Sydney, Australia, gave him a prize for "the most distinguished scholar of the year." He went back to the Solomon Islands to take up his duties as a native medical practitioner among his mother's tribesmen. It does not seem like drawing too long a bow to entertain the thought that Dr. Geoffrey Kuper may very well have been the "trader's son" who came to the aid of the young naval lieutenant and gave his injury such skillful advanced first aid that made it possible for his leg to be saved.

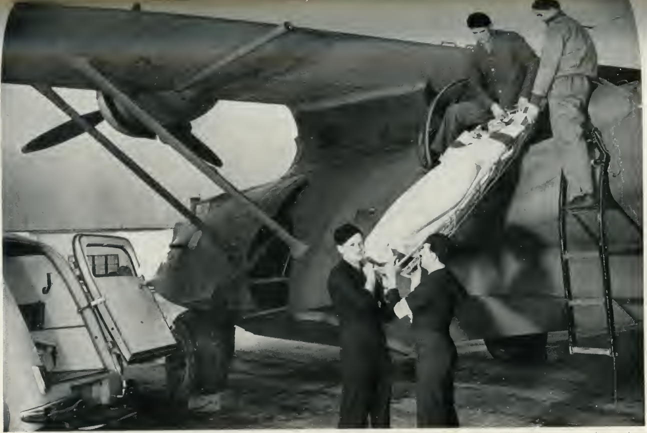
When the lieutenant told his adventures he was a patient in a United States Navy advance base hospital on the island of Espiritu Santo in the New Hebrides, which is the island group lying between the Solomons and Fiji. Our medical officers landed on this island late in August 1942, just two weeks after the Navy and Marines took the lower Solomons. Captain Joel J. White (MC), United States Navy, commanding officer, chose a site for the American Naval Hospital in a grove of coconut palms within sight of the sea. They set up their first tents, laid floors, stretched wire screens around the operating theater, which they had brought with them, and around the tents they intended to use for patients. Six days later they took in their first eighty-four patients, which had been evacuated by plane from Guadalcanal. The hospital was ready to care for wounded from the U.S.S. *Wasp* when the 14,700-ton aircraft carrier went down in the vicinity of the Solomons on September 15, 1942.

By the time the young lieutenant and his two men were brought there from Santa Anna Island, the hospital had grown to an orderly row of Quonset huts and floored, screened tents, with accommodations for six hundred patients. Its staff numbered seventeen medical officers, including three surgeons, a neuropsychiatrist, and specialists in other fields, and some two hundred hospital corpsmen. It had X-ray machines, a pathological laboratory, and a warehouse stocked with medical supplies. All these and the three operating theaters were needed to care for the wounded from the battle off Savo Island, who were then being brought in by ambulance planes.

One of the inventions of American businessmen is the mail-order house. Everyone knows what a part this institution has played in the development of rural America. The principle is a sound one and has been adopted by the Navy Department in supplying materials for this global war. The Medical Department has assembled at key ports vast quantities of hospital and medical supplies which are packaged and crated ready for immediate shipment to any part of the world. This system makes it as possible for a medical officer in charge of a field hospital in the Solomons, or a base hospital in Iceland, or one on the coast of West Africa, to order by radiogram one hundred hospital beds, with the necessary fittings and linen, as for Mrs. Smith on a North Dakota ranch to write her favorite mail-order house for a pair of shoes. The distance the hospital equipment has to travel is many times greater; but today we have a growing fleet of transport planes capable of carrying vitally important supplies in answer to calls from medical units wherever these are located.

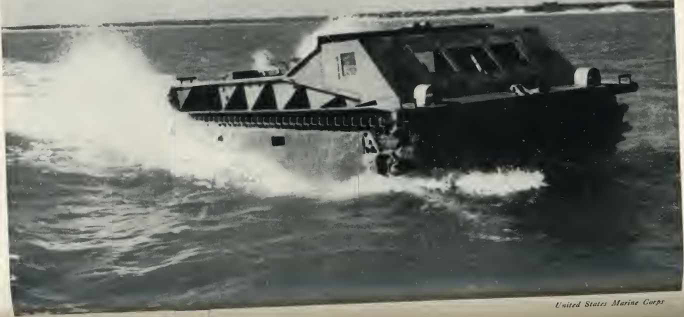
The cargo planes assigned to long ocean flights are big, four-engined flying boats. They exceed 60,000 pounds' gross weight when loaded and are capable of carrying thousands of pounds of pay load to our farthest-flung outposts. Hospital beds, operating-room supplies, instruments, drugs, dressings, X-ray equipment—all the material of mercy—are transported as readily as the material of war.

This air-transport service and the air-ambulance service, of which



*Official United States Navy photograph*

UNLOADING PATIENT IN A STOKES STRETCHER FROM NAVY AMBULANCE PLANE



United States Marine Corps

MPHIBIAN TRACTOR (ALLIGATOR AMBULANCE)

I shall speak later on, are doing something to balance the toll taken by aviation in this war. It is true that the great number of war casualties are caused by fighters in the air. It is just that aviation, which spreads death and destruction, should also provide us with means of getting relief to the wounded and in evacuating casualties to hospitals where they can be treated outside the zone of war operations.

We have learned in the action around the Solomon Islands that war casualties can be adequately cared for, even though we are operating in islands that are isolated and amid all the disadvantages of a subtropical climate. Men wounded in the fighting on Guadalcanal who have received first aid from a hospital corpsman have then been taken to the field hospital on Guadalcanal for further attention. From Henderson Field on Guadalcanal the flying ambulances take off for the advance hospital at Espiritu Santo in the New Hebrides and to others located in the Southwest Pacific.

The ambulance planes are fitted to carry eleven litter cases and four or five sitting patients, in addition to one medical officer, one pharmacist's mate, and the crew. This service has made it possible to fly wounded out of the islands on the same day their injuries were incurred. They are brought out at night and flown several hundred miles to one of our large hospitals, where they get their operative treatment the next day—that is, if they are sufficiently out of shock to undergo that sort of treatment.

It is now only a matter of hours before a Marine who has been hit by a sniper's bullet in the dense jungle of Guadalcanal is undergoing an operation in safe and serene surroundings, hundreds of miles away from the scene of his injury.

Before engaging in mass transportation of patients by air, it is necessary to consider the problems peculiar to aerial flight, and the bearing these will have on the proper selection of patients.

Casualties which have sustained chest wounds, or penetrating wounds of the stomach and intestines, cannot be safely transported by air; nor can patients with strangulated hernia or intestinal obstruction be carried at high altitudes. There is always danger in moving pneumonia patients by air ambulance because of the effects on them of altitude and lowered oxygen pressure. In the event that a pneumonia patient must be moved by plane, he should always be provided with oxygen breathing apparatus. Patients suffering from head injuries, with or without skull fracture, require to be moved with extreme care, since the intracranial volume rises with ascent, and therefore an aggravation of symptoms is to be expected upon reaching higher altitudes. Insane patients should be moved by plane only when under complete restraint, since a sudden violent act by the patient could very conceivably be disastrous.

Actually there is less discomfort to the patient from a three-hour flight than from a twenty-minute ambulance ride from the landing field to the hospital. Before we started our air-ambulance service in the South Pacific we had the reports of the value of such service to the German Army during its invasion of Poland. In that campaign 2,500 patients were reported evacuated from Poland to German hospitals. On the return trips the aircraft carried medical supplies and replacement personnel. The United States Navy has used aircraft for emergency ambulance work in isolated places for many years, but we have learned from the enemy the value of extending and enlarging this service.

A vehicle which looks as though it had lumbered straight out of Walt Disney's film *Fantasia* and belonged to the age of the dinosaurs and enormous reptiles is the alligator ambulance. These gas-driven "swamp buggies" were designed for rescue and relief use in the storm-stricken areas of Florida. They move through water, mud, and sand, and are capable of transporting supplies and material from ship to a location on shore in one continuous trip. They make nothing of swamps and reefs.

The Medical Corps of the Navy has experimented with these alligators to bring the wounded from shore to hospital ships with less discomfort and possible injury than they would sustain by evacuation in small boats. One of these alligators will carry nine Stokes stretchers, each of them seven feet long and two feet wide. When the stretchers are in place, held by canvas straps, there is a twenty-inch air space between the tiers and room for the doctor to have access to each patient.

The thrilling escape of Captain Eddie Rickenbacker and his six companions, after twenty-one days at sea, might not have been possible but for the previous establishment of that little one-room hospital of eight or ten beds on an unnamed island in the Solomons. The Navy plane which rescued Captain Rickenbacker and the others with him in one of the rubber boats brought them to the island where they were the first patients in the temporary hospital. A few days later, when the medical officer in command of the hospital believed they could stand the trip, all but two of the seven men were transported by air ambulance to our hospital on Samoa. The promptness and perfect running of this evacuation service undoubtedly saved those lives. It is noteworthy that the service was operating at the very time we were meeting the enemy in the battle off Savo Island.

Not a man has been lost through an accident in transit, although one plane load was forced to spend two days on a coral reef when the ambulance plane had to make a forced landing to escape damage in a severe tropical storm.

Not every flier is due for shipwreck. Just the same, a rubber raft is part of the equipment of every Navy plane. Every Navy flier is instructed in "dunking sense"—otherwise, how to manage the raft, use the supplies stowed in its watertight pockets, and how to eat, drink, avoid painful sunburn and windburn, immersion foot, and other liabilities of shipwreck—in case he and his crew have to come down at sea.

Most of the rafts have three pockets, one of which is detachable for use as a bailer. The first pocket contains a whistle for signaling, metal reflector for visual signaling into the sun, twenty-five feet of line, jackknife, combination compass and waterproof match container, fishing kit, smoke-grenade holding clamp. The second pocket contains patching material, rubber cement, roughing tool, pliers, scissors, six leak plugs. The third pocket contains a hand pump for keeping up air pressure, jointed oars, and sail fabric.

The waterproof fabric container for the emergency equipment, which is usually attached to the raft by a ten-foot line, contains a first-aid kit, one package of emergency rations per man, two twelve-ounce cans of emergency water per man, two H-C smoke grenades, and one can of fluorescein, which is a dye. When this is sprinkled over the side, the dye makes a conspicuous yellow-green stain on the water which attracts the attention of searching aircraft.

Sunburn and windburn can cause serious toxic reactions. We instruct the men to keep their clothes on, even in the hottest climates, as necessary protection. In intense heat, the men are told they should "dunk" themselves over the side, fully dressed. This is a help against dehydration, which is the chief danger shipwrecked sailors have to face. They are also instructed to improvise head coverings or use a parachute or the sail fabric as an awning. This sail fabric is orange yellow on one side and dark blue on the other. The orange yellow is to serve as a signal. The dark blue is for purposes of concealment from enemy aircraft. The men are trained to yank the sail down and spread it over them, sea-blue side up, if they sight the enemy. If he strafes them, they are prepared to go over the side and hang onto the raft, which will continue to float even if a hole is shot in one compartment.

Contained in the first-aid instructions are directions to rub exposed surfaces of the body with the oily part of a raw fish, especially the fatty layers just under the skin, as some protection against burn. To guard against immersion foot, caused by continued exposure to cool or cold water, such as that collecting in the bottom of the raft, the men are taught to get their feet out of the water periodically by swaying back in the boat and elevating the feet to dry. While so elevated, the circulation must be kept up by vigorous chafing. This is highly important, otherwise gangrene may set in.

Under dehydration the system turns to any source for liquid. Therefore, while the kidneys may function freely, bowel movements are generally few, since they consist of 90 per cent moisture. Even one movement a month can be considered normal under these extraordinary circumstances.

In the instruction course on how to survive shipwreck, our men are taught to collect every drop of rain water, even if their emergency supply remains untouched. The waterproof sail fabric, which is a 56 × 56 inch piece, is spread to collect rain. Then the water is poured into the bailing pocket, after using the first of it to rinse the sailcloth and the pocket to free them of salt. Shirts and underwear can also be used to soak up rain water which is then wrung out into the bailing pocket. Naturally, the bailing pocket, when filled, must be kept buttoned. It is so well constructed that if the raft capsizes, provided the men right it quickly, there is a fair chance that the supply of fresh water will not seep out or become brackish.

If the water supply is low, raw fish, which has a high moisture content, together with the liver and the solid but not the soft parts of the entrails, may be eaten. Fish blood is not harmful and is advised.

The Life Saving Board of the Navy and the Coast Guard has just announced that a carefully planned fishing kit is now being added to all rubber rafts. The kit contains lines, pork strips, sinkers, a mackerel jig, a couple of feather jigs, a grapple, a harpoon for taking small sharks, turtles, and birds, a honing stone with float handle, various sizes of hooks, a twelve-inch dip net, and instruction sheets printed on waterproof paper. The instructions warn against fishing for sharks or in the vicinity of them. Small sharks may be harpooned, but the fisherman must be alert to keep the line taut and save the harpoon if the shark tries to roll over and bite the line. Large sharks are to be discouraged by a hit on the nose with an oar. The instructions also tell how to cut the fish into thin, narrow strips and dry them in the sun. Fish can be preserved in this way for several days.

Fish supply both food and drink. Fish juice is not only safe, but not unpalatable. It tastes much like the juice of oysters or clams. If there is an excess of fish, pieces can be squeezed in a twisted cloth to force out the juice for drinking purposes. Jellyfish, sea snakes, parrot fish, and puffer fish are poisonous, as the fishing directions make plain, but the old saying that there are plenty of fish in the sea, aside from these taboo varieties, holds true and has saved the life and the reason of many a shipwrecked sailor.

We have been warned that we may expect a much higher rate of mortality in the present war than we suffered during World War I. But, at the same time, we are seeing a tremendous improvement in the care of war casualties. Those who survive their injuries to reach hospital care have a far better chance of recovery than patients had in 1917–18. This is due, first, to the use of the sulfa drugs in preventing infection and promoting healing; second, to the use of blood plasma and human serum albumin and to the ready and adequate supplies of these which are now available wherever our medical service is established; third, to the fact that we have adequate hospital facilities, such as are found in the best civilian hospitals in the country, within a few flying hours of the front line; and fourth, to the rapidity of evacuation of wounded out of the combat area.

During World War I some of the wounded remained in combat areas eight to ten days after their injuries were received, with consequent bad effects on their physical and mental condition. We have learned a great deal more about shock than we knew twenty-five years ago. That knowledge is now saving lives that without it would be lost. We know that a severely injured man lying in a hospital within range of enemy artillery fire and bombers has not the chance of recovery of a man who knows he is in safe surroundings. The mental state of apprehension and the nervous tension that come with living in a danger zone not infrequently weigh the balance in favor of death.

It is still too early to speak with any authority on the subject of war neuroses, but our medical officers serving at the front report that this seems far below the number of cases encountered during World War I. This is not an aspersion directed against the men who fought gallantly in the Argonne and elsewhere. It is a testimony to our greater understanding of the human nervous system and to vastly improved methods for caring for mental cases.

As was expected, malaria and dengue are the principal health problems in the Solomons. Those particular islands, with their heavy rainfall and lush, shadowy jungles, have long been notorious breeding places of pernicious mosquitoes. Undoubtedly this fact as well as the ferocity of the islanders is what has kept them in their primitive and undeveloped state. The white men who settled in the neat little British capital of Tulagi as well as the inevitable Chinese compradors and ubiquitous Japanese were necessarily heavy users of quinine. Apparently the natives of the islands were more or less immune to malaria and dengue, though natives of other islands succumbed to the diseases as readily as the Europeans did. The cutting off of the supply of quinine gave the malarial mosquitoes of Guadalcanal a chance to ally themselves with the Japs—not that the insects did not take their toll of the Japanese. Our men captured a good many of the enemy who were much reduced by malaria.

As soon as our forces established themselves on Guadalcanal, the medical officers and hospital corpsmen attached to the first landing units set to work to establish what measures of mosquito control were possible in that remote wilderness from which the enemy had not yet been evicted. The vast coconut-palm groves which formerly supplied valuable oils for the great British firm of Lever Brothers were systematically raked, to prevent a single empty coconut shell lying there from becoming full of stagnant water in which the disease carriers could breed. The bush around Henderson Field was cut away to eliminate dark, damp places for mosquito breeding grounds. Huts were screened and the men going into the jungles, to fight the enemy still lurking there, were supplied with anti-mosquito lotions to rub on their bodies.

Atabrine has been given a severe tryout in the Solomons. Rear Admiral William Chambers (MC), United States Navy, reported, after an inspection trip to the South Pacific, that "the synthetic substitute for quinine is being taken routinely by the men as a malaria preventive, and is performing successfully."

The continued use of atabrine stains the skin a yellowish tinge. This, combined with the heavy sunburn of the men fighting in intense tropical heat and under blazing sunshine, has made many a sailor, soldier, and Marine look like one of the Polynesians themselves.

CHAPTER XIII

# Wardroom and Forecastle

THE BULKHEAD, which stands between the Navy's enlisted personnel and the officers, divides life aboard the most congested ship at sea into two separate and distinct worlds. Only two men who wear gold braid ever break through that bulkhead between wardroom and forecastle. These are the chaplain and the medical officer.

You cannot have been a member of either corps for many years without acquiring an understanding of what I suppose might be called the Navy mind and the Navy way of life, as these function on each side of the bulkhead. If you have been long in the service, you will have talked—and intimately—with men of every rank from the apprentice seaman, second class, who has yet to use his issue razor, to weathered captains and rear admirals. You will have listened to extraordinary stories, some of them haltingly told, many of them pitiful, not a few memorable for their revelation of character, ingenuity, and fortitude. You will have sat by deathbeds and stood by at funerals in naval cemeteries far from the home port. Never, as long as you live, will the man in Navy uniform be just another man to you. He is someone you know—the inner recesses of whose life and mind you have been permitted to glimpse. You know him drunk and you know him sober. Sick and well. Delirious and sane. Through fair weather and storms. In the brig and out of it. He has stood before you naked and unashamed. And let me add, from that apprentice seaman, second class, to the admiral of the Fleet he has your respect. If you have measured up to the opportunities and the privileges attached to your job as medical officer or chaplain, you will have his too. Speaking personally, I do not know any satisfaction deeper than that.

In the Navy, of course, there is no charge for professional attendance. The sailor has his own way of expressing gratitude for services he believes were well performed. A few weeks ago I received a letter from a retired boatswain's mate living in Iowa, stating that I had operated on him in 1924 in one of our naval hospitals for a suspected cancer of the stomach. He wrote that he had been well ever since that time, but now he was getting on in years and felt like setting his affairs in order. The purpose of the letter was to tell me he wished to will me his corpse for further anatomical study. All he asked was that I inform him as to the preservation of his body after death and give the address where I wished to have it sent.

Before replying I consulted the records of the Navy Department and found that I had operated on him at the time and under the conditions he stated. The expression of his gratitude was a bit unusual, but there was no doubting its sincerity.

Like the medical and dental officers, Navy chaplains are put through a six weeks' indoctrination course at the School for Chaplains at Norfolk, Virginia. This indoctrination has nothing to do with the theological doctrines they profess, but in the course of it they acquire a knowledge of Navy life which stands them in good stead when they go to sea. Their ears become accustomed to sailors' language, which frequently isn't of the sort generally considered suitable to parsons. One sea-seasoned chaplain nodded wholehearted approval when a sailor told him after a battle, "I tell you I prayed like hell the whole damn time!"

The chaplain aboard one of our ships was a great dog lover, and, in the course of a cruise, acquired a wire-haired terrier of the female sex. The dog had to be kept out of the officers' country because there were several other canine pets there who had prior claims. When the chaplain wanted to exercise his pet on deck, word would be passed down to the forecastle: "Send up the chaplain's bitch!" The humor of this order was as much appreciated by the chaplain as by anyone else aboard.

The men of the Navy make two demands of their chaplains—they want them honest and they want them energetic! War at sea is no place for a frail, religious mystic whose muscles are flabby. Swimming is not one of the prerequisites to a divinity degree, but a Navy chaplain may find it comes in handy. Lieutenant M. F. Williams, chaplain of the U.S.S. *Wasp,* was among the survivors swimming in the oil-covered water about the abandoned torpedoed carrier. "I was doing a fine bit of Australian crawl," he said, "when I saw the captain swimming toward me.

"'Are you sure you're all right, Chaplain? Can't I help you?' he called out.

"I told him I was getting along all right. And then the captain poured on the coal and outdistanced me in a few strokes. I had a feeling it ought to have been the other way round, I being the junior by years and in rank. I ought to have been able to outswim him and not seem as though I needed his help. I was going over this in my mind when up swam the admiral.

"'Here, can't I help you, Chaplain?' the two-star officer offered.

"I gasped that I was doing as well as could be expected, and let him know I intended to make port under my own steam. Just the same, I took a couple of reefs in my pride when the admiral struck out and left me panting behind in his wake."

The chaplain has one of the toughest jobs aboard ship. Largely because he has no job at all in the usual Navy sense of standing watches or manning guns. He plans his own day, and, to a considerable extent, his own duties. At sea he usually takes over, in addition to his traditional duties, those of recreation officer. Frequently he is editor of the ship's paper. He arranges for movies when black-outs don't prohibit him. He stages amateur nights, smokers, boxing matches, arranges quartets and choirs for Sunday services. He usually supervises the ship's library. Every day he visits the sick bay, where he may bring some magazines, write an important letter home for a disabled sailor, or help straighten out some of the complicated financial and matrimonial tangles sailors get themselves involved in.

The door of the chaplain's office aboard ship usually stands open invitingly. It is a rare day that a dozen men don't drop into his room for a chat. They may want a half-hour of good conversation as much as advice.

The chaplain is sanctuary and his confidence is complete and absolute. It often is the chaplain, and only he, who knows the full story in discipline cases. Often he has a few words with the man which encourages him to tell the whole truth in his testimony—something which may affect the man's later life. At shore stations and at sea religious services are held every Sunday morning, barring an engagement with the enemy. At sea, church often is rigged up in a messing compartment below deck. In addition to the weekly service, the chaplain holds Bible classes for instruction in the Scriptures, preparation for baptism, confirmation, and marriage.

During an engagement at sea the chaplain is busier than at any other time. Before the wounded start coming into the hospital he very likely is giving a play-by-play account of the battle over the ship's public-address system to the men below deck. When things seem to be going against us, it is the chaplain's self-appointed task to keep the morale high. As soon as any of the men are wounded, he is apt to go into action with the medical officers and hospital corpsmen. He then takes his place in the sick bay, where he can lend a hand as needed and can give comfort to the dying. If the man is of another religious faith than his, the chaplain says a prayer for the dying and repeats with him a form of confession acceptable to the man's church.

Sunday services were held for our Marines soon after they began to take over the Solomons on the cricket field of Tulagi. Chaplain Warren W. Willard, United States Navy, had been with the detachment since they made their first landing. When the landing parties were zigzagging up the beach and being sniped at by enemy sharpshooters strapped in trees from which they trained rifles and machine guns on the advancing Marines, Chaplain Willard went along with the hospital corpsmen to give first aid to the wounded and spiritual comfort to those whose wounds were beyond the help of drugs and dressings. Later, when a dressing station had been established and three medical officers were busy operating on surgical cases, the chaplain pitched in and turned himself into an efficient assistant surgeon and anesthetist.

Though "See the chaplain" is the stock Navy phrase, meaning "Don't bother me with your troubles," there are many men who find it easier to go to the doctor for advice and even for confession than to a sky pilot. Their previous experience with the clergy may not have been such as to lead them to think the man who buttons his collar and vest in the back knows life in the same terms as one who buttons his in front. They may feel hesitant about sharing some unsavory and even discreditable experiences with someone who is professionally "good."

A doctor occupies the middle ground. He is supposed to be impervious to shock. Moreover, he has no obligation to go heavy on morals. His concern is primarily with health—with what is "good for you." And, too, many a sailor remembers his own "family doctor" and the respect in which he was held by his mother and father. A lot of the regard that is given to the medical officer aboard ship is an inheritance from the general practitioners in small towns all over America, who have established a reputation for doctors as possessing patience, understanding, tolerance, and an almost magical ability for getting fellows out of scrapes.

You sit down at your desk in the sick bay to go over some reports and suddenly there is a discreet cough behind you. You swing round and find a husky fire controlman standing there. From the look of him you know he has something on his mind he wants to get rid of, and that you have been picked for the target.

What has Fire Controlman Sanford worried? There's a letter in his hand, from a girl back in Norfolk. She writes that she is pregnant and that she expects him to marry her the next time his ship is in port.

"Well. Are you responsible for her condition?"

Fire Controlman Sanford thinks not. It is true his recollections of his last liberty are somewhat vague. He remembers the girl all right, but he also remembers she paid much more attention to a boatswain's mate from another ship who was on the same party than she was willing to extend to a mere fire controlman, third class.

"I remember it made me sore at the time," Fire Controlman Sanford explains. "She was a canary, all right. But she couldn't see me for this boatswain—and him with a wife and two kids in San Diego."

Speaking as man to man, you give Fire Controlman Sanford some sound advice on the subtlety "canaries" may exhibit at times, and that their ways are not only more wonderful but also more dangerous than those of a serpent on a rock.

You relieve your feelings by dictating half-a-dozen telling sentences and a few biological questions to be incorporated in Sanford's reply to his would-be bride. And you end by counseling the reluctant bridegroom not to go ashore when the ship puts in at Norfolk next time. Or, if he does, to go under guard.

He thanks you warmly and leaves. You don't see Fire Controlman Sanford again for weeks. You wonder, occasionally, what happened to the Norfolk canary. Then you forget her.

Months later a man is brought to the sick bay with a badly burned hand. There's something familiar about him, even before he gives his name and rating for the records. Fire Controlman Sanford again. He lingers after you have finished the dressing.

"I've been meaning to come and thank you, sir, for helping me out that time."

"That time" requires no explanation. You remember now about the Norfolk canary.

"You're not married?"

"No sir," Fire Controlman Sanford breathes thankfully. "It was a close shave, but I made it. Thanks to you. I wrote her what you said. Not just what you told me to write, but plenty about what you said some women are like," he grinned. "I kinda think when she got through reading the letter she figured I wouldn't be the easy-going husband she was looking for."

Not only do the enlisted men themselves turn to the medical officer for more than medical advice, they write home to their families about "Dr. So-and-So"—with the result that every mailbag brings you letters from worried or grateful mothers, from wives, would-be wives, and from the girl definitely left behind. They ask:

"Why hasn't my son written me?"

"I hear my Willie has had chicken pox. I hope his skin is not marked. Please, Doctor, relieve a mother's anxiety."

"I do not believe in vaccination. I do not wish my son to be vaccinated, or given any blood plasma."

"My husband writes me he has meat every day. Don't you doctors know that too much meat causes rheumatism? I enclose my recipe for nut-meat loaf."

And—this more frequently than a sentimentalist likes to admit—"Why doesn't my husband send the money he promised me?"

Even before the general public accepted the dictum that the endocrine glands are responsible for vagaries of personality the Line officers had a way of calling in the medical officer on cases of chronic insubordination. In every ship's crew there are usually one or two persistent troublemakers. They are the fellows who habitually get into trouble with the shore authorities and for whom you have to establish a shore patrol.

The purpose of the patrol is to preserve order among the men who are ashore on liberty and to enforce whatever regulations concerning the port the senior officer present may issue. A medical officer and several hospital corpsmen usually are detailed for duty with the shore patrol to render emergency medical and surgical treatment if needed.

In a well-organized community the shore patrol has little to do. But in cities with no welfare activities, numerous saloons, houses of prostitution, and an inefficient police force, the shore patrol is apt to be kept pretty busy.

Gradually you get to know the habitual troublemakers among the crew: the fellows who get drunk every liberty; the men who can't get drunk without being disorderly; the men with bad tempers which will explode at every opportunity.

Captain Arthur J. White (MC)—the same Dr. White who served with such distinction aboard the aircraft carrier *Lexington*—told me about his experience with one of these bad men. The boy had been in trouble a number of times, for insubordination and for getting into fights with the other men in his watch. Apparently he was one of those who can't stand teasing. The other men quickly discovered it, of course, and took a devilish delight in goading him to anger. His officers had tried all the disciplinary measures, but none of these seemed to straighten out the troublemaker. At this point they turned the matter over to Dr. White as a last resort.

The doctor had a long talk with the man. What he wanted to find out was the history of the bad temper.

"Huh," said the sailor. "If you think I've got a bad temper, sir, you should see my mother."

That told the doctor a lot. After his interview with the man, he gave as his opinion that this lad who had had no training in self-control would do better in a small group than in a large one. He had asked the boy whether he would be interested in qualifying for the Hospital Corps, and the answer was that the boy thought he would. Dr. White proposed that he be transferred to the corps and tried out in that capacity. If he couldn't get along there, it seemed as though there was nothing to do but dismiss him from the service with a dishonorable discharge—something to be avoided whenever possible.

"It was extraordinary how well the fellow did as a hospital corpsman," said Dr. White. "He was intelligent, and no shirker. He seemed to like having a sense of responsibility and being trusted instead of being under suspicion. In our work he was with a small force and he was able to get on with them without any fights. We came back to port from the cruise, and, in the wardroom, I had quite a reputation as a psychiatrist.

"My hospital corpsman was transferred to shore duty in our hospital at the port. I left him there when we went to sea again. I had some qualms, I admit, but he had done so well the last few months we were at sea I couldn't help believing he had subdued his maternal inheritance. However, it wasn't more than six months later that I had a letter from him. He had been dismissed from the service. Apparently he was not geared to stand working in a large group. I always felt sorry about that boy."

One of the duties of the ship's medical officer is to supervise the number, type, and character of pets or mascots which the members of the crew wish to bring aboard. There are innumerable stories of sailors risking their own lives to save pets. "Admiral Wags," the dog of the commanding officer of the ill-fated carrier *Lexington,* was lowered over the side before the captain abandoned his ship. A similar thoughtfulness for a dog occurred on the destroyer *Blue,* lost during the Solomon Islands engagements.

Naturally, a sailor has an unusual opportunity to make a selection of a pet, and it is surprising what a variety of dogs, goats, cats, pigs, monkeys, bears, burros, kangaroos, parrots, parakeets, cockatoos, et cetera, are picked up on his travels. I have known more than one small pig to be adopted as a ship's mascot and kept scrubbed snowy white by the crew.

When I was serving aboard the battleship *Illinois,* while the Fleet was in Seattle a young bear was given to each ship. The bears were shown with a great deal of pride by the various crews, in parades and to visitors aboard ship. As we proceeded on our voyage, various vicissitudes were experienced by them and some were lost. However, we managed to keep ours, and he became quite a pet.

While we were at Punta Arenas, on the Strait of Magellan, our consul to Tasmania, who happened to be from the state of Illinois, presented us with a kangaroo. This animal was rather unusual. He would hop around the decks, up on the turret, and from there to the after bridge, and during these perambulatory escapades the bear would make a futile effort to follow him.

One day, during the firing of a salute, the bear happened to be on the boat deck right above the gun, and during a blast he fell to the deck, apparently unconscious. One of the crew immediately sent for me. I put on a pair of loading gloves and examined him. He soon began to walk around, and I went below, thinking he was all right. In about five minutes I was again called, and responded immediately, but alas, the bear was dead, apparently having died from a fractured skull.

On one trip home we were at Alexandria, Egypt, in December 1908, when we were ordered to proceed to Messina, Italy, to render assistance, as there had been a devastating earthquake which entirely destroyed the city and caused tens of thousands of deaths. On our arrival we immediately sent ashore a working party of about four hundred men, who began digging in the area where our consul had lived.

There were numerous homeless cats and dogs about the ruins. Our men saw a large mastiff on the third floor of a house, the front walls of which had entirely collapsed and whose stairways were completely blocked. They rigged a ladder and finally reached the dog, which had been there for at least ten days. The dog was lowered in a sling, brought back to the ship, fed and bathed by a boatswain's mate. The dog was devoted to this man and would have nothing to do with any other member of the crew, nor would he come back to the officers' quarters. He was finally brought back to the United States.

Many amusing stories are told about these ship's pets and the excuses men give to get permission to bring them aboard. Once, while the U.S.S. *Wyoming* was in Vera Cruz harbor, a man brought a Mexican hairless dog aboard and asked my permission to take him home. I could not imagine what a "he sailor" wanted with a dog like that, and said so, frankly. The man said he had heard that these dogs cured rheumatism and his old grandmother was bedridden with that affliction. He intended to use the dog as a hot-water bottle.

The crew's compartments aboard ship are only comparable to the subway during rush hours. There is usually a writhing mass of humanity struggling in and out of hammocks and through the passageways. There is the blare of hundreds of small radios—broadcasting the patter of Jack Benny, Fred Allen, Charlie McCarthy, and Bob Hope, and the swing music of America's favorite dance bands.

The sailor hasn't much room for personal possessions, but nearly every man in the officers' country and in the forecastle manages to find six square inches of wall space for the photograph of a girl.

The ship is a man's world—or so they say. But every fighting ship afloat carries its complement of women. These are the women in the photographs which are pasted to bulkheads, set up over bunks, on desks, even above the sink in the pharmacy where the pharmacist can look at *her* as he works.

Many a junior Line officer has lain awake nights wondering, somewhat uneasily, just what his men really think of him, or what they say of him in the sanctuary of the forecastle. When Captain Harry Garrison (MC) was executive officer of the Norfolk Naval Hospital, he was given an opportunity to know just where he stood with the enlisted personnel.

Captain Garrison had a trick of getting into a pair of disreputable dungarees and going out with the gardener and outside laborers to work in the hospital grounds. One fall afternoon the captain was raking leaves when an enlisted man came along and started to converse with him. The enlisted man's chief topic of conversation was his complaint that the blankety-blank exec was never in his office. The man had been trying for several days to see him about a leave of absence.

Garrison remarked mildly, "Aw, try him around nine o'clock tomorrow morning."

When the man turned up at the office at that hour, recognized Captain Garrison and recalled a few of the epithets he had heaped on him, he turned several shades of green. Captain Garrison made no reference to the day before, only signed the man's request for leave, and remarked, "Out of the mouths of children, drunkards, and fools, the truth is sometimes spoken."

One prerogative dear to all sailors is that of "shooting the sun." Actually, this means sprawling on deck and growling interminably about the ship, the officers, the food, Navy life, and the world in general. No one would think for a moment of interfering with this harmless pastime in which a lot of excess steam is let off and which does nobody any harm. And again "terms of endearment," which the landlubber wouldn't exactly appreciate, are frequently expressed concerning their leaders. Presumably it was such a group of men aboard Admiral Halsey's flagship who watched the admiral and his aide going down the deck. Back in the admiral's cabin, the aide remarked with a grin, "Did you catch what one of those fellows said, sir? As you passed I heard one of them say, 'I would fight through hell for that old S.O.B.!' "

The admiral drew his celebrated eyebrows together. "Humph! Where does he get that *'old'* stuff?"

CHAPTER XIV

# Why Sailors Get That Way

WE HAVE HEARD a great deal about the number of mental cases in our veterans' hospitals as the result of World War I. Pensions, medical care, and maintenance of mental patients in special institutions have already cost the United States $1,000,000,000. These cases constitute not only a heavy burden, but a grave problem and a warning. What, one asks, is going to become of the war neurotics and mental cases which may be reasonably expected to result from World War II?

The first answer to that problem lies in prevention. We cannot afford to allow mental cases to develop among our Army and Navy. So far, psychiatry has not advanced to the point where it may be said to be in step with medicine and surgery. Actually, we are able to do very little to cure mental cases. Our hope lies in being intelligent and skillful enough to prevent them.

Because of this heavy number of mentally ill war veterans and the records of hundreds of thousands of mentally unfit who had to be sent home from the training camps in 1917–18, a psychiatric service has been established in connection with all our training stations. Obviously, it is more economical of the Government's money and the Navy's time to discover and weed out men who are emotionally unstable, and therefore bad military risks, as early in the game as possible.

Too often families and communities have the idea that a problem case should be shifted onto one of the services. Let the Navy discipline Joe when his parents, his teachers, and the local police authorities have all failed at the job. Frankly, the Navy does not want Joe if he is a problem. He may be a dementia-praecox case, or hysterical, or too maladjusted to behave after the normal pattern. The Navy can't afford Joe for the reason that the mentally and emotionally unstable constitute a danger to the other men in their divisions and companies. They are dangerous if they can't be counted on in an emergency—and to do their duty efficiently at all times. They lower the efficiency of the whole; and it is the efficiency of the whole—not the dashing exploits of one hero—which inevitably turns the tide in the direction of victory.

Six months before the raid on Pearl Harbor which launched this country into a naval war, the Navy's Department of Medicine had established a neuropsychiatric staff and psychiatric board. One of the first duties that faced us was that of training psychiatrists, used to civil practice, in the requirements of naval life. The civilian psychiatrist gives a great deal of time to each patient—to the study of his background and environment. This knowledge is necessary for the psychiatrist's work. He, like the civilian physican and surgeon, frequently is called on to patch up and keep going individuals who, at their best (to put it bluntly), can never be 100 per cent. More than half of the civilian practice of medicine in all its branches consists in keeping somewhat disabled human beings going at the best rate of which they are capable.

In the Navy, our job is quite the reverse of this. We have first to decide carefully whether a man is going to be able to function at 100 per cent efficiency. If, in the opinion of specialists, a man is never going to be fit for full duty, he must be dismissed from the service with a disability discharge. If his incapacities are discovered before he has been inducted into the service, he must be rejected for enlistment. If the incapacities do not show themselves until after he has received some training, then loyalty to the service demands that he be returned to civil life as speedily as possible.

This is not hardness of heart nor disregard of the weak and unfit. It is merely putting first things first. The first thing for the medical officer is the efficiency of the service. He has taken an oath to set that before everything else. He breaks that oath if he succumbs to the quite human temptation to work with a case which shows interesting symptoms, and so keeps a man in the service who is of no use to the service.

In addition to his oath to set the efficiency of the service before all else, the medical officer carries the responsibility of spending or saving United States funds. His signature to a pension claim is considered final. It is his moral and patriotic obligation to see that the Government's money is not expended wastefully and uselessly and that our hospitals are not crowded with incurable cases to the exclusion of men who can be cured, and who, when cured, will take their places again on the ships and at the guns.

Obviously, it is impossible for a psychiatrist accustomed to civil practice to advise Navy personnel until he himself has learned by experience some of the demands of Navy life. The Navy regarded as a community is very large, widely scattered, autocratic by military necessity, with a great complexity in its functions, movement, communications, and personal relationships. It is a world of active men. It is also, in strict contrast to civilian life in America, a world untinctured by feminism. To be suddenly transplanted into this world from, let us say, the life of a small town where boys and girls mingle freely in all sports, schools, and businesses, and from a home in which a mother may be the dominant power, is a change which is immediately reflected in the behavior and psychology of the youthful "boot."

A great many of our recruits are from seventeen to nineteen years of age. Many of them have never been away from home before; they have never lived beyond the influence of their families and school companions. If some of them seem to get a little out of hand or turn homesick during the first ten days at "boot camp," these may be normal reactions and not necessarily indications of an inability to adjust to a new, vigorous, and strictly masculine environment. The Navy's psychiatrists serving at the training stations quickly learn to discount a number of symptoms which the psychiatrist in civil practice might feel were indicative of an antisocial attitude or a sprouting neurosis. This is not callousness, but practical common sense based on the experience of seeing a lot of lads, who mope through their first days at boot camp, suddenly snap out of it and become good sailors.

The homesick recruit has come in for a lot of ridicule, most of it more or less good-natured. A librarian at one of our stations watched a homesick sailor prowl around the shelves, looking, he said, for some book to cheer him up. In a box were a lot of secondhand books sent to the library, which the librarian had not yet had time to go over. The recruit asked if he could look through them, and was told he might. He came up with a volume which he asked permission to borrow, saying he thought it would help him to get over his homesickness. The book was *The Well of Loneliness.*

With our present system of having psychiatrists attached to the medical staff of every training station to which recruits are sent, there is little chance of dementia-praecox cases not being spotted early and dismissed from the service. The symptoms of this disease of the young are now sufficiently well determined to make the psychiatrist quickly aware of it. Emotional instability is less easy to recognize under ordinary circumstances.

Aptitude tests and questionnaires have been devised as aids in discovering instability of temperament. The questionnaires ask particularly about previous employment, jobs held and the length of time spent in each one. Frequent changes of occupation—when these have not been occasioned by the family's moving, or by industrial conditions—give a clue to instability.

If this is backed up by a record of juvenile delinquency, inadequate education, and the revelation (to the psychiatrist) of a quick, irritable temper, the man is put down as a bad risk for the Navy.

Many young men seeking to enter military service try to cover up their neuropathic tendencies. Some of them do this out of pride; others because of a zeal to serve their country; still others because they recognize their own deficiencies and hope that military experience will give them a means of escape. We try to screen out these cases during the examinations at the enlistment offices. Those who get by and arrive at the boot camp are usually discovered by the doctors there in the next week or two.

In training men for parachuting a particular phobia concerning jumping has come to light in a sufficient number of cases to make the medical officers aware that it is something to look for always in training personnel. This type of man is afraid to jump, but he will jump to prove to himself and to the world in general that he is not afraid. This man will jump from anything, anywhere at command, but he will never make a good parachutist because he is not able to think during the descent. All his thought is concentrated on himself—on his own fear and sensations. Therefore, he is unable to handle his parachute properly. He may usually be spotted during his training period when the paratroops jump from towers. When the chute is released at the top of the tower, he will "freeze" and be unable to follow directions called to him by his instructor during the fall. Unless he is eliminated, sooner or later he injures himself—sometimes fatally.

When such a man is suspected during tower training, it has been found effective to try him out on the "opening shock device." This is a machine which simulates the shock received by a parachutist when leaving the plane in flight. Sometimes quite dramatic results are obtained from these tests. Frequently men throw away their rip cords, "freeze," and are completely incapable of following commands. Others flatly refuse to pull the cord ring of the machine which will give them the shock. Nothing can be done with these cases but to advise them to enter a different branch of the service in which there is no occasion for jumping. It is rare that the fear they experience in connection with jumping extends to other combat activities.

Depressed mental states occasionally occur among new, especially youthful personnel, who may have a sense of inferiority, due to youth and inexperience.

Take the case of R.L.W., a seventeen-year-old recruit of the Marine Corps, who was admitted to one of our hospitals because of a depressed mental state, general nervousness, and complaints of dizziness and pains in his chest. The physical examinations discovered no organic disease. For the first two weeks he was under observation in the hospital. He was very depressed, desiring to stay in bed, complaining about his eyes, dizziness, headaches, and chest pains. He refused to eat, would not listen to the radio, and could not be interested in any ward activities. Mental examination revealed marked anxiety largely relative to his home, and difficulties in adjusting to service life. He had a sense of inferiority, and admitted he was afraid he could not make good in the Marine Corps. The psychiatrist went to work on him and succeeded in giving him an insight into the situation. He was not suffering from a deep-seated sense of inferiority, but from the effects of sudden change of environment and living habits. His illness, mental though it was in origin, was none the less real, and the result of complete change of environment and his own immaturity.

As a result of the talks with the psychiatrist, he began to improve. He appeared rested, and began to show an interest in recreational and occupational activities. His anxiety disappeared, and with it his headaches, dizziness, and chest pains. He was discharged to duty.

Examination several weeks later revealed that he had had no return of the trouble and was carrying on his duties as a Marine efficiently.

Psychopathic personalities have great difficulty in adjusting to the demands of military life. They are characterized by aggressiveness, egocentricity, defective judgment, inability to profit by past experiences, unreliability, and irresponsibility. They lack perseverance and are emotionally unstable, swinging from moods of high spirits to irritability and black depression. They are full of suspicions. They make no attempt to adjust themselves to the environment, but rather they attempt to make the environment over to suit themselves. As a rule, these men are slow to adjust themselves to military life aboard ship. They may be stubborn, indifferent, resentful of discipline, and unready to carry out orders without first offering some argument or excuse. If one of these men leans to paranoia, he complains that his mates and officers have it in for him and are working against him. Usually he shirks his duties and tries to do as little as possible. He is the man you will find reading cheap literature in some out-of-the-way corner when he should be shining brightwork. He is constantly being brought before the mast for minor infractions of the rules.

The medical officer has an excellent chance to pick out these patients, since they invariably are frequent visitors at the sick bay, malingering illness in an attempt to obtain special favors or to get out of work. If the disorder progresses to a more serious stage, the man's condition may disrupt an important part of the ship's routine. Into this class falls the sexual offender, who oftentimes is a mental case. Sooner or later he is apprehended and brought to trial, with the result that a number of important officers must drop their regular duties and put in time and effort on his case. The episode produces an unhealthful atmosphere aboard ship which could and should be avoided.

On the other hand, our man may have criminal tendencies and indulge in petty thievery—another crime which has to be brought to trial. This type of behavior brings discredit upon the entire Navy service.

Ultimately such men cost the Navy more than they are worth to it. It is part of our medical program to discover them by various aptitude tests and eliminate them before money and time are invested in them.

Experiences so far in this war indicate that approximately 60 per cent of those who suffer nervous breakdowns are predisposed to such disabilities. It seems logical to believe the same to have been true of the mental cases which resulted from World War I. Approximately 20 per cent of the total number drawing compensation from the Veterans Administration are disabled mentally. It has been estimated that the average cost of caring for a mentally disabled serviceman for the duration of his life is close to $35,000. Up to the present war 55 per cent of all the beds in military hospitals were occupied by patients with neuropsychiatric disorders.

A common problem among recruits is that of illiteracy and semi-illiteracy. It is one thing to determine merely whether or not a recruit can read or write. It is quite another to determine whether he can read and understand what he has read by means of a standardized method. The recruit is tested by being required to read aloud a paragraph at his normal rate of speed. Then questions are put to him, the answers to which reveal how much he has comprehended of the material read aloud.

It is extraordinary what wide individual variations in reading rate and reading comprehensions are shown by this test. There are recruits who possess normal and above-normal intelligence but who have never learned to read or write sufficiently well. Many of these have come from foreign homes in which another language than English was spoken, and from families which could not afford to keep their children in school beyond the lower grades. It is for the psychiatrist to decide whether the recruit is likely to remedy this condition through study or whether he is disinterested to the extent that he will become a Navy liability.

Frequently illiteracy can be traced to inadequate education due to a transient family, need of employment at a youthful age, lack of interest in school, or inability to learn. The first two causes are distinctly environmental and are readily understood. Recruits who are inadequately educated due to these causes not infrequently show up well in the Navy's courses of instruction. They learn readily from observation and become excellent seamen. The other two causes are under suspicion as revealing possible psychopathic tendencies.

The outstanding cause of war neurosis, apart from predisposition, is the unconscious fear of death or disablement, plus the conscious fear of pain, loss, or uncertainty of what is to happen next.

That too much care cannot be taken at the recruiting office is generally admitted. The weeding out at camps and training stations of the vagrant, the ne'er-do-well, the potential criminal, the mentally unfit, is of incalculable advantage to the military services, but it is not enough in respect to war neurosis, since the approximately normal are subject to this affection.

Military unpreparedness and the hurried and intensive training necessary to atone for this unpreparedness are no small factors in the production of war neurosis. Discipline, the relation of officers to their men, the importance of athletics, frequent liberty and leisure when circumstances permit, and medical care—all these tend toward contentment and freedom from worry.

During World War I soldiers who spent many months in the trenches under continuous shelling and without activity suffered shocks to the nervous system which men who had the relief of action did not undergo.

British medical officers report that the type of combat stress which prevails in the present war appears to have done less psychologic damage than did the static type of warfare which obtained almost throughout World War I.

The soldier of today has more opportunities for aggressiveness and individual action. He is more able to get into action quickly and to retreat quickly if necessary. The retreat to Dunkerque and the evacuation across the Channel duplicated or exceeded in stressful experiences some of the retreating actions of World War I. It was under conditions of exhaustion, deprivation of food and water, and a discouraged loss of hope for relief that an acute type of neurosis developed after Dunkerque. But the recovery was rapid in most cases, and the burden of mental casualties does not appear to have been great.

In the Navy, men serving aboard submarines live under a greater nervous tension than the crews of the big battle wagons. Submarine personnel is carefully selected and carefully observed for evidences of nervous disabilities. So are the Navy's pilots. These two branches of the service take extraordinary toll of the nervous system. The men in them are more liable to "crack-ups" due to environmental conditions, fatigue, apprehension, and strain, than are men serving aboard cruisers and destroyers.

Because of the small crew of a submarine and the circumstances in which the sub operates, the life aboard has an intimacy which is unknown on the larger ships. The birthday of every member of the personnel, from the skipper to the youngest mess boy, is known and celebrated. The cook bakes a special birthday cake for each one. Those birthday cakes do a lot for the morale.

After almost every naval battle, disaster, or event of threatened catastrophe, there are some psychotic casualties serious enough to be hospitalized. The emotional effect of danger cannot be overemphasized. The importance of having only the most stable individuals in the service follows as a matter of course. If we do not select our men carefully, our striking power will be greatly impaired.

Here is where we approach the matter of discipline. Unlike the civilian community, the Navy cannot allow for wide individual differences. It is, in fact, totalitarian—a totalitarian machine in the service of democracy. It requires that the individual submerge his personal self and become part of the greater self of his ship or his battalion. Even in times of peace there are individuals who are unable to do this. They respond emotionally in ways which we describe as neurotic and psychotic. But many who are able to function successfully in military service in peacetime prove unable to bear the additional burdens imposed by the dangers of war.

During the last war we had a number of cases of "soldier's heart" and various circulatory disturbances and gastrointestinal conditions, including peptic ulcer. Since that time we have come to realize that these physical symptoms are frequently built on a basis of emotional conflict. It is not unlikely that observation of mental cases among our armed forces will contribute materially to the general store of knowledge concerning mental illness in all its myriad forms.

On one occasion in one of our hospitals a patient was in the mental ward under observation. There was some doubt in the minds of the medical officers as to whether he was mentally deranged or merely "faking."

He was a husky sailor, and among many peculiar actions and demonstrations he insisted that he was "Bozo, the Snake-Eater." At that time there was a vaudeville performer showing his act in a near-by city, entertaining large audiences by actually swallowing live snakes.

This patient apparently got his idea from this. He kept shaking the bars of his room and yelling in a loud, raucous voice, "I'm Bozo, the Snake-Eater! Give me some snakes! I like them! I thrive on them! I want to eat them!"

This clamor kept up for days. Finally the attending doctor decided to try him out. He arranged with a dealer in snakes to bring a few to the hospital. When he arrived, they proceeded to the patient's room.

When the sailor saw the snakes, he howled with glee and yelled, "Snakes! Now I'll have my breakfast! Give them to me!"

A small snake was handed him, and to the surprise of all concerned he put up such a show of swallowing it that the dealer grabbed it by the tail, expostulating: "Hey, you're too good; that's my prize snake and I can't afford to lose it."

I don't remember what label we attached to this unique mental case, but everyone was satisfied it was "mental."

The medical officer always has to be on the lookout for neurotics who are sent to the hospital for some minor injury, and who stay on the sick list to keep from having to go back to duty or, occasionally, in hopes of getting a C.D.D. (certificate disability discharge). These personalities present a real problem in our naval hospitals where, as has been explained, patients are necessarily kept longer than in civilian hospitals. It is frequently a nice point to decide whether it is better for the man to continue to hospitalize him or to get him back into duty before he develops "hospital-bound" tendencies.

For this reason, among others, the morale of a hospital ward is extremely important. The atmosphere should be kept cheerful and impersonal. Emphasis should be placed on getting well and back to duty, and not on the disabilities which brought the patients there or on the various forms of treatment they are undergoing. It is good policy not to refer to the complaints too frequently. After you have once gotten a complete history and have made a thorough examination, try to treat your patient. Watch for symptoms—*don't* continually ask him about them, thereby often helping him to remember what you are trying to help him to forget.

War neurosis is not a new disease, nor is it truly a casualty of war. It is the appearance of previously existing neurotic tendencies brought to the front and organized into form by exposure to war's demands. Fatigue, long periods of strain in a battle area, overwork, and exposure deplete the energy of the nervous system and provide a fertile ground for the growth of the individual's previous neurotic tendencies.

Men who have gone overboard from a torpedoed ship and have drifted for days on a raft or in a cramped rubber boat—with either insufficient or no food and water, and with the constant menace of the sea and enemy planes—are apt to be "queer" for a bit and to suffer disorders of the nervous system for some time after their rescue and return to physical health. The wounds the mind suffers strike deep and are slow to heal. This is not evidence of weakness or of psychopathic tendencies. It is true of every normal and brave man. The man who can undergo the physical horrors of war unmoved by the continued presence of death, suffering, and the loss of comrades is more apt to be psychopathic than the man who suffers nervous injuries as the result of his experiences in action.

It is not the incidence of injuries that concerns the psychiatrist so much as how the patient reacts to the injuries and how quickly and completely he digests them. It may take a man who has been shipwrecked and subjected to long exposure, hunger, thirst, and anxiety weeks—even months—to make a comeback. The remarkable fact is that the majority do come back. Human beings are tough and amazingly resilient. They suffer, endure, and go on. They are not the men they once were; frequently they are infinitely better. If proof of this contention is called for, I recommend for your consideration more than a score of naval medical officers who have gone through torpedoings, shipwrecks, bombings, months of jungle living, malaria, dysentery, and fatigue and who are still at their posts, in remote hospitals and dressing stations, doing difficult and delicate surgical operations, treating obscure diseases, and thereby keeping faith with the service to which they are dedicated.

CHAPTER XV

# Let the Navy Do It

BY THIS TIME the reader cannot fail to have caught the idea that the medical officers of the Navy, not only aboard ship and in naval hospitals in all parts of the world, but at various isolated stations and with landing parties, are not infrequently called upon to render services not strictly naval.

The natives in many ports and islands have learned that most naval ships carry a doctor. They come out to our ships in dugouts and in every type of small boat, risking their lives in treacherous weather to request treatment for themselves and to beg the doctor to come ashore with them to treat some sick member of their families.

During the early years of our occupation of the Philippines, our gunboats cruised in and out among the numerous islands, showing the flag, making friends, and gradually teaching the islanders the advantages of being part of a great democracy. In those days, before we had adequate refrigeration aboard the smaller ships, we used to depend on the islanders for fresh food, chickens, eggs, fish, and fruit. On entering port, the skipper would hoist a signal flag, asking for the articles desired, and the natives, with whom the signal was prearranged, would come out in boats loaded to the gunwales with garden produce and live fowls tied together by the legs. One delicacy, dear to the Filipinos, they never could get us to buy. These were *balutes,* actually eggs almost due to hatch and considered very tasty by the islanders.

The medical officer acted as a medical missionary—though most of us would have protested violently at having our services described in these terms. At all events, we helped inculcate in the minds of the inhabitants a feeling of security and the realization that we were there to give them a better life than they had known under the previous regime. We taught them the importance of hygienic measures, the necessity for uncontaminated water, and the dangers of unsanitary surroundings in childbirth. We treated their sick and performed various surgical operations. As a result the doctor was much sought after and was highly respected. They gave him a place far superior to that of officers of the Line.

An amusing story used to be told by a much-beloved naval officer, "Juggy," later Rear Admiral Charles P. Nelson. I have heard him tell the experience, and I believe on one occasion he recounted it—using nautical terms—to a Medical Society meeting in Philadelphia, where it was the high moment of the convention.

When "Juggy" was a midshipman he commanded a small gunboat operating in and about the Sulu Sea; a "spit kid," as that type of craft was then called. Juggy was one of those daring and versatile personalities who attract adventure wherever they go. His ship had put into one of the small island ports and was lying peacefully at anchor when a native appeared at the gangway and asked for the medico. The gunboat carried no medical officer, and the man was so informed, but he persisted in his demand, and his demands were so persistent that one of the men went for Juggy.

"Sorry," Juggy told him; "we have no medico aboard. There is nothing we can do for you."

Then, as the man made no attempt to leave, he asked what the trouble was. The native told him his wife was trying to give birth to a baby but wasn't having much success with it. Even the village midwives had despaired of the case. But when word ran through the settlement that an American ship was in port, everybody concerned expected the American medico to perform the necessary miracle.

"Sorry," Juggy repeated. "It's too bad. I wish we could help you, but there is nobody aboard who knows about such things."

This the distracted husband refused to believe. He pointed to Juggy's gold braid and indicated that he thought every naval officer was a doctor. He gave Juggy to understand he had great respect for the officers of the United States Navy and that respect was founded on his belief that there was nothing one of them could not do. Perhaps this was a challenge Juggy could not resist. Anyway, he agreed to go ashore and assume the duties of obstetrician. As he told the story:

"On entering the shack, I ran into heavy weather. The wind was howling and the deck was covered with wreckage, but no life lines had been rigged."

To paraphrase his account, he proceeded to take command and ordered the various visiting women to their battle stations. Decks were cleared for action. Life lines were rigged. Gourds were filled with water, and small piles of sand were provided. After a few hours of maneuvering, and with the aid of the deck force, the child was born. Juggy took a double hitch in the cord and cut it with a bolo—the only instrument at hand. The aftermath, as he called it, appalled him not a little. He didn't know what it was, decided it was the liver, and therefore should be retained as an essential part of the human anatomy. However, in spite of his valiant efforts, Nature asserted herself and Juggy let her have her way. "After the gale subsided," he finished, "I ordered the sails to be furled, and stowed the rigging."

He used to say the experience caused him to lose five pounds in weight, but he figured this was more than made up by the tonnage of the successfully launched infant insurrecto. The gratified father, whose faith in the powers of the United States Navy had been substantiated, expressed his appreciation by presenting Juggy with a goat and half a ton of fresh coconuts.

In those years of establishing order in the Philippines we ran across a lot of extraordinary characters. Some of them were war lords in their small way and ruled their islands with dictatorial powers. We in the Navy had to be extremely diplomatic at times in our dealings with the chiefs to prevent trouble and organized interference with our work in making coast surveys, charting channels, and transporting men and supplies to various isolated stations. About the most picturesque of these island dictators was Dato Pedro Cuevos. Pedro was a Filipino. Nonetheless, he was "Dato," or chief, of the Moros on the island of Basilan. He had had a colorful career, being an individual of power and influence, and endowed with that intangible something which marks every true leader of men. The Spaniards had had trouble with him and had finally imprisoned him in their fortress at Zamboanga. One night Pedro, aided by a few loyal followers, let himself over and down the wall of the fortress into a native proa in which he crossed the twenty miles of water between Zamboanga and Basilan. There he surrounded himself with more followers and eventually became dato by the simple expedient of killing off those who opposed him. Perhaps due to his experiences with the Spaniards, Pedro espoused the American cause. He proclaimed himself our ally, and, consequently, we had very little trouble maintaining our hold on Basilan. However, Pedro liked his wine, opium, and women, and did not restrict himself in his enjoyment of all these pleasures. It began to be whispered that the dato's health wasn't what it had been. His dissipations were proving too much for him. One day a runner came to our naval station on Basilan and asked me to go and see the chief. We all knew that Pedro was of great use to the American cause, and it was to our advantage to keep him alive and powerful. The rumors of his ill health which reached our ears could not have failed to reach the knowledge of several aspirants to the position of dato. I left the station with the advice of the other officers to keep Pedro alive at any cost.

The dato lived some distance away from the port. In company with a couple of Marines and a Marine officer, and with the runner to guide us, we proceeded along the coast and then up a small river, which provided a waterway into the dense, shadowy jungle. Presently we came to a landing. Our arrival was seen at once, and the dato's bodyguard, a group of fierce but picturesque-looking Moros, clad in G strings and turbans, which proudly proclaimed their Malayan origin, emerged from the bush and formed an imposing welcoming committee on the dock. There were as many different types of knives as there were guardsmen. The company provided an arsenal for a collector.

They led us to a nipa shack, built on posts about eight feet up from the ground. Under the house the dato's pigs rooted and grunted companionably and his prize fighting cock, tied to one of the posts, came out and challenged our approach. We went up the ladder while the guards stood at attention at its foot.

The hut had a bamboo floor. In the center sat Pedro, surrounded by his wives and innumerable progeny. The guards had followed us up the ladder and took their places around the walls of the hut, watchful of every move we made. I put a few questions to Pedro in Spanish and after he had answered them, he agreed to let me make a physical examination. As no one present felt the necessity of leaving during the examination, and as the dato's wives and children kept pressing closer and closer to the patient and me, not to miss any stage of the procedure, it was slightly inconvenient, to say the least. The bodyguard wasn't taking any chances with me either. They regarded my stethoscope with suspicion. When I applied it to their chief's chest, a murmur went round the wall and I could see hands reaching for the krises. Fortunately, the dato merely grunted and gave no sign of pain throughout the examination, or the Marines and I might have been annihilated.

The examination over, I gave the dato some advice about the wisdom of cutting out and cutting down on certain of his favorite habits. I promised to send him some American medicine. After a drink of his own coconut-palm concoction, we departed, taking one of his men with us to bring back the medicine.

What I sent were two bottles of beef extract, having given the runner explicit directions how the chief was to take this internally. Several weeks later one of his lieutenants came down to the naval station with a request for more of the wonder-working medicine. He said the dato was almost cured of his illness and feeling fit for the warpath again and was most grateful to the American medico.

For some years Pedro continued to rule Basilan and remained friendly to the Americans. Later, long after I had left the islands, I heard that the chief had been butchered in a native revolution.

After the Boxer Rebellion in China at the opening of this century, all the foreign legations in Peking were granted the right to maintain armed guards to give their nationals protection in the case of another uprising against foreigners. We also kept a regiment in Tientsin to keep the port and the railroad from the capital open, should there be any serious trouble.

At our legation in Peking our guard of United States Marines sometimes numbered as many as six hundred officers and men. In the course of years this guard acquired a number of horses. These were sturdy little Mongolian ponies which various foreign residents in China had bought, used as polo ponies, and then on going home had sold or given to the American Legation Guard to assure them a good home. As much to exercise the ponies as to make a show of military authority, at a time when the country was in the grip of several war lords whose armies kept up a continual fight against each other, in which the foreigners in China occasionally became involved, our Marines rode a mounted patrol around Peking. In the course of this daily patrol they rode into various adventures which frequently brought my services, as their medical officer, into demand.

I went out to Peking in 1924 to serve as medical officer of our Legation Guard. My wife went with me and we lived at the American Legation. It was at a time when the war lords were causing everybody a lot of trouble. Undoubtedly the not-so-fine hand of Japan was helping to stir up a good deal of the trouble. Fighting in North China went on continuously. Everybody grew accustomed to the rumble of guns and puffs of smoke on the horizon. Everybody more or less expected an occasional spray of machine-gun bullets across a street or a stealthy rifle fire from around an angle of house wall. Twice during our three years' service there Peking was captured by different generals.

When that happened our hospitals and dressing stations were crowded. Probably the world's most appalling medical problem today is that of China, with its enormous population and its few doctors and nurses. Even at present, China's army of 5,000,000 has less than 1,000 doctors. The American Bureau for Medical Aid to China, which has been incorporated in United China Relief, is making valiant and much-needed efforts to train medical officers, pharmacists, sanitary technicians, and nurses to meet the country's need.

During the fighting around Peking I gave my services as a surgeon; but with inadequate supplies of drugs to work with, insanitary conditions everywhere, poverty, cold, and starvation, I used to look at the wounded whose injuries I tried to repair and ask myself how long they could be expected to survive the dangers of infection and disease.

In December 1925 a large battle was fought in the vicinity of Tientsin, about seventy miles from Peking. It gets terribly cold in North China, and the temperature at that time was around zero. A few days after the battle the wounded began to be brought into the capital. Every day, and all day, a stream of wounded Chinese poured in through the city gates, seeking medical aid. They came in trains, in rickshaws, in wheelbarrows, and in donkey carts. A great many came on foot, dragging themselves painfully over the frozen, rutted ground. They poured into the city, hungry, ragged, dirty, and diseased—the most pitiful stream of humanity I have ever seen.

General Feng Yu-Hsiang had made no provision for care of the wounded. The war was moving too rapidly and unexpectedly to allow for a medical program. The staff of the Peking Union Medical College, financed and conducted by the Rockefeller Foundation, responded to the need. All foreign doctors in Peking, as well as all Chinese doctors and nurses available, took over the care of the casualties. Dr. Mont Reid, of Cincinnati, who was in Peking at the time, and I offered our services and assumed charge of the temporary operating room. My assistant medical officer and the hospital corpsmen attached to the Marine Guard were our assistants, along with some American missionaries who were on the spot. I used the missionaries and my hospital corpsmen as anesthetists, and they became quite adept with chloroform—ordinarily a dangerous anesthetic. We had three operating tables set up in a small room, which was heated by a coal stove. The wounded were carried in and placed on the tables. The surgeon had no idea what type of wound would present itself next. Most of it was typical war surgery—shrapnel and bullet wounds.

It just happened that I had to remove an eye from each of two soldiers in succession. A short time later the female nurse, who was assisting at another table, called to me: "Dr. Oman, you're an eye surgeon. Won't you help us with this case?"

I answered, "I am not an eye surgeon. I am a naval surgeon." As I responded to the call, it struck me that being a naval surgeon included a lot of odd jobs—above and below the belt—that the newly commissioned medical officer never expected to get into.

In all, we treated thousands of wounded, operating around the clock for many days. There were a great many cases of tetanus, as the supply of antitoxin—produced by a well-equipped laboratory located aptly enough in the gardens of the Temple of Heaven—was inadequate to the demands.

In addition to our soldiers and Marines in North China, we, like other foreigners who did business on the Yangtze River, patrolled the river. At the time of my service in China we kept three gunboats on the Yangtze. The incident of the U.S.S. *Panay,* one of those gunboats which the Japanese sank off Nanking in 1937, may be considered their initial attack of the present war.

The most wonderful trip I ever made in any part of the globe was up the river from Shanghai to Chungking, a distance of some 1,500 miles. In those days, now nearly twenty years ago, the Yangtze was a crowded thoroughfare, its muddy waters floating junks and sampans heavily loaded with bamboo and other woods, and with resin to be turned into varnish—an industry which made Shanghai famous—with oil, opium, and large cargoes of salt. The crews of the junks and the men poling the sampans had reason to curse the foreign vessels in the river whose greater draught and speed made a heavy wash, which frequently threatened to swamp the Chinese craft, loaded with about six inches' freeboard. When this happened, you had to be on the lookout for shots fired in retaliation. At the same time, the opposing war lords were fighting it out on each bank of the river. Villages were changing hands every other day, and passage up the Yangtze was as dangerous as traversing a no-man's land under enemy fire. More than once my wife and I had to flop to our bellies on the deck of the small river steamer in which we made the journey upriver to the wonderful old city of Chungking.

The gunboats were there to protect American business interests and American missionaries, and to make sure that our nationals got equal rights with other nations.

Frequently, when there was trouble ashore, American businessmen and missionaries took refuge aboard the gunboats. Frequently, too, the medical officers of our gunboats would be called on to help the missionary doctors ashore during an epidemic or with some difficult surgical operation.

All this service—which at first may seem far removed from that expected of a naval officer—is part of the great, world-wide, war and peacetime program of the Navy. It is "showing the flag" in all parts of the world; building American prestige, creating in the minds of all peoples of all races the idea of the United States as a great democracy. This is essentially one of the Navy's jobs. It is for this reason we have cruisers and send them about the world in time of peace. They, and the men aboard them, are a vital part of our national propaganda, and necessary as long as and wherever we want to do business with other nations.

Talking about international relations, political as well as commercial, reminds me of an experience early in my naval career while I was serving aboard the gunboat *Frolic*.

The Russo-Japanese War was on, and the *Frolic* was ordered to the harbor of Chefoo, China, to observe the war. There is something amusing in the picture of this tiny craft standing by as a spectator of the battle between the Czar's and the Mikado's fleets. Perhaps our Government thought our diminutive size would make us practically inconspicuous or at least ensure both belligerents protecting or overlooking us. At least no one could take our presence in the war zone as an intimation that the United States had entered the war.

I don't know what our military observations amounted to, but in the course of the weeks we spent in Chefoo harbor I had a chance to become acquainted with some of the extraordinary workings of international law.

On the morning of August 11, 1904, a Russian destroyer, the *Rechetelni,* came into the harbor, having escaped from Port Arthur. She was officially interned, according to international law, by the Chinese admiral who was in port. The Russian commander was quite agreeable to this, particularly as the fighting at Port Arthur had been heavy and he had gotten his ship away only by desperate effort; also three Japanese destroyers which had chased him were visible in the distance, waiting like cats for the mouse to come out of the hole.

They hung there on the horizon all that night. Early next morning, exactly twenty-four hours after the *Rechetelni* had come in, the Japanese steamed in and captured her after a short fight. There was considerable commotion in the harbor for a while, but there was no resistance from the Chinese. The Japs took the Russian ship in tow and sailed out of the harbor toward Port Arthur. In the course of the engagement there were a number of casualties which necessitated my services, but, as usual, where the Japanese are involved, there were more dead than wounded.

This matter of the *Rechetelni* raised a nice point of international law concerning the inviolability of neutral ports. It was something worthy of our observation as an indication—had we been competent to interpret it—of the Japanese attitude in such matters, an attitude which actuated their later invasion of Korea and Manchuria. An international commission was appointed to take up this problem of the violation of the neutrality of the port of Chefoo. The commission finally rendered an opinion that Japan was not at fault. It stated that the war was being fought in Manchuria, which was Chinese territory, and when Japan invaded Chefoo harbor she merely extended the zone of war.

Since we are talking here about various odd jobs the officers of the Navy, especially of its Medical Department, are called on to perform in various parts of the world, something must be said about the work of our sanitary engineers, epidemiologists, and quarantine officers in such countries as Haiti, Santo Domingo, Nicaragua, and the Virgin Islands. These places lie close to our home shores, and the health conditions there are extremely important for the menace they could bring to the health of many American ports. In our treaty with Haiti, ratified in 1916, the United States acquired the right to organize the National Public Health Service of the island, which, at the time, was the most unhealthful spot in the Western Hemisphere, and—for its size—in the world. Our Marines were on duty in Haiti to put down the rebellion and establish law and order there. Logically, therefore, the direction of the Public Health Service of Haiti was turned over to medical officers of the United States Navy.

When the Marines landed in Haiti in 1915 we took over two hospitals in Port-au-Prince and started to clean up the city. Haiti had long been a breeding ground of yellow fever. All the voodoo charms and the herb medicines of the islanders were powerless against the epidemics. The blacks wore necklaces of lemons which, it was believed, would prevent the yellow jack. Probably this faith in the value of the lemon was a survival of the faith in lemons as a cure for scurvy, dating from the years when British, French, and Spanish ships bought lemons in the islands as an antiscorbutic for their crews.

Smallpox ravaged the island. Vaccination was practically unknown. A conservative estimate set the number of cases as one million! Our medical officers set to work with vaccine. As soon as it was demonstrated to the Haitians that the scar made on their arms by the American doctor with his little needle would keep away the smallpox, there was such a mass demand for vaccination that we could not keep up with it. The Navy actually vaccinated one million patients in a single year.

While this campaign was in progress and was being reported in Washington, an investigating committee went down to the islands to look things over. One senator, who wanted to assure himself that the vaccination of Haitians was really taking place as reported, suddenly asked the medical officer, who was showing him around town, to tap ten natives picked at random from the crowd in the market and have them show their vaccination scars. The officer, who had been doing all he could to sell the idea of public-health work in Haiti to the senator, felt a shiver down his backbone at the prospect of such a test. However, with the senator's eye on him there was nothing he could do but beckon to ten passers-by and ask them to show their arms.

All ten had been vaccinated, and all ten were "takes!" The senator went home convinced that the Navy was doing a good job in Haiti, and the medical officer went home and took a much-needed drink.

The island was divided into ten districts, with a medical officer from the Navy and a pharmacist's mate in each district. The pharmacists' mates had their hands full, trying to enforce sanitary regulations among people who had no idea of what these meant, or the benefits that would accrue from them. Nowhere in the Western Hemisphere was the general mass of population so poor, illiterate, superstitious, suspicious, underfed, and sick. Each district showed all the diseases of the tropics that can be caused by filth, unclean water, and polluted ground.

Educating the Haitians in keeping themselves, their houses, and their premises clean frequently called for military measures. A medical officer, on duty in the capital, sent first polite, then peremptory requests to a leading citizen to get him to obey the health ordinance which forbade the keeping of scavenger pigs within the city limits. The pigs' owner paid no attention to the doctor's communications, and the local authorities showed no disposition to make him observe the health ordinance. They told my friend that he was a powerful politician and was not to be disturbed about his pigs. However, he continued to be disturbed, though, it must be confessed, without results. Then came the presidential election. The pigs' owner was elected president of Haiti. In conformance with state etiquette, all the foreign officials were received at the palace by the newly elected president. My friend, the American medical officer, attended with some diffidence. He didn't like to remember some of the terms he had used in his communications. As the line moved along to shake hands with the new chief executive, my friend moved with it. Finally, his name was announced. He waited a second to see how the president was going to take it. The president put both his hands behind his back and glared at the American. "So *you* are the person who has been writing me letters about my pigs!" he thundered.

To the honor of the Navy the doctor stood his ground. "I am," he said. "They are a public menace!"

Suddenly the president grinned at him. He clapped the doctor on the shoulder. "They are," he admitted. "But I'll tell you a secret, Doctor, now that I have been elected I can afford to butcher them. And I will."

While the work of cleaning up the cities was going on, there was also the problem of safeguarding the health of American Marines stationed in various parts of the island. The excellent health record maintained among our troops in Haiti testifies to the vigilance of the Navy's Medical Department. For instance, at Jacmel, with a population of 40,000 blacks, among whom were cases of every tropical disease known, we had one hundred and ten men, only one of whom was lost during the occupation. And he insisted on drinking himself to death.

One of the jobs facing the officers stationed at Jacmel was to separate the lepers from the rest of the population. The doctor made friends with the bishop, who had his residence in the town, and interested him to the extent that he sent to Martinique for three nursing sisters. Every morning the nuns were mounted on burros and, in company with the pharmacist's mate, would ride out to the hastily constructed lepers' hospital to inspect cases.

It was one of our medical officers, Dr. Paul Wilson (MC), United States Navy, then stationed at Jacmel, who first grasped the enormous significance of yaws as the physical curse of Haiti. Dr. Wilson declared the first need of rural Haiti was soap, salvarsan, and sunshine. "And *le bon Dieu* furnishes the last." Obviously, it was up to the Navy to supply the soap and the salvarsan.

Yaws is a disease which is considered a blood brother of syphilis, though non-venereal in origin. It is believed the disease came in the slave ships from Africa. It was the chief damage to the slave trade, and has caused a tremendous economic loss to Haiti through the past two centuries. Yaws is essentially a disease of the country people, and as the wealth of Haiti depends on its agriculture, it is readily seen how the scourge costs the islanders millions of dollars annually. Prior to 1915, the country people of the island had practically no contact with the towns, as there were few roads and not even trails across the mountains of the interior. Even after the public-health work in the coast cities was progressing successfully, there remained the mountainous interior of the island, a place of jungles, deep valleys, and also inaccessible ridges into which no white man had ever penetrated. In the rural districts, it was safe to say everyone had either malaria, yaws, or intestinal parasites, or two, or all three of them. In the villages, life went on very much as it had gone on in the days of Toussaint l'Ouverture. The voodoo doctors practiced their art and magic and the herb doctors dosed patients with all sorts of concoctions Many of these remedies were the same as those in use in Europe in the seventeenth and eighteenth centuries. For instance, in Haiti up to twenty years ago, they were still using a dressing of macerated cockroaches for wounds—a remedy used generally by military surgeons during the eighteenth century.

To reach the rural districts, our medical officer devised a clinic, which traveled by pack train, with tents, a cook, and generous supplies of soap, salvarsan, vaccine, and quinine. "The crawling clinic," Dr. Wilson called it, for the slow progress they made on the mountain trails. When they reached a good camping site, they would set up the tents and hunt for patients. At first the country folk were suspicious and afraid of the white doctors. Only a few had the courage to come to the clinic and ask for treatment, but as the news traveled—as such news inevitably does travel in primitive communities—the fear abated. There were days when as many as 1,000 patients presented themselves, showing every sort of disease. For weeks at a time the clinic was lost in the wilderness, so it was necessary for Marine Corps aviators to fly over the region twice a week to drop food, mail, and messages. The success of the Navy's traveling clinic brought about the establishment of some one hundred and forty rural dispensaries, which have done extremely good work in improving the health conditions among the islanders.

According to our treaty with Haiti, once the National Public Health Service had been established and had proved its worth, it was to be turned over to native doctors. A medical school and a school for Navy nurses were organized by our medical officers. The nursing situation was handicapped by the caste system among the blacks. It was considered improper for a girl who had any education to do any manual work. It took a great deal of persuasion and discipline on the part of our Navy nurses, who taught in the school, to break down this old taboo. Since 1920 the Nurses' Training School has been under the American Red Cross.

That the work in Haiti, covering a period of some fourteen years, was worth while was proved in 1927 when a severe epidemic of typhoid broke out in Port-au-Prince. The Haitians practically stormed our hospital there, demanding anti-typhoid inoculations. As many as 1,000 were treated every morning at the outpatient department over a period of weeks, and since that time the typhoid rates in Haiti have been as low as in the best cities of the United States.

The Navy is often called upon to proceed to areas which have been devastated by earthquakes. Ships evacuate civilians—men, women, and children filling the spaces and decks to overflowing. Occasionally a baby is born on a man-of-war. Recently, I believe, a motion picture was being shown throughout the country in which the medical officer aboard one of our warships was called on to deliver a woman refugee and was unequal to the task, turning the job over to the ship's carpenter. This was a libel on the Navy doctor, and ridiculous in the bargain! Every medical officer of the Navy has had training in obstetrics in medical school and during his interneship before he was allowed to specialize in naval medicine.

When Managua, Nicaragua, was leveled by an earthquake in 1931, the U.S.S. *Relief* was at Panama. The field hospital was loaded into planes and flown to Managua, where it was of great service in the work of rescuing.

At the time of the earthquake, the carrier U.S.S. *Lexington* was at Guantánamo Bay, Cuba, 900 miles away. She received the call for medical aid, supplies, and serum. Her skipper put on all speed, and, traveling at thirty knots, the *Lexington* made 715 miles on her dash to Central America. While still 150 miles from shore, five planes were launched from the carrier, carrying four doctors, three hospital corpsmen, 400 pounds of medical supplies, and three times that weight in rice and beans. The planes flew 370 miles to Managua, which is high in the mountains, and dropped their passengers and cargo, after which they returned to the carrier lying off Greytown.

In peacetime, the movements of the ships of the Fleet are more or less routine—maneuvers, target practice, visits to foreign ports, and overhaul and repairs in their home yards. In former years the Atlantic Fleet spent the winter months in Cuban waters, and we always looked forward to the trips with much pleasurable anticipation. Right after the holidays, when everyone was fed up with festivities and had spent all his money, we were glad to sail south for a few months.

At Guantánamo Bay, Cuba, our Navy maintained clubs for officers and the enlisted personnel, with baseball grounds, tennis courts, facilities for hunting, fishing, swimming, and camping. We trained our crews at small-arms target practice and would send camping parties ashore for varied lengths of time. Fine, fresh Cuban cigars were plentiful, and a short boat ride would bring us to restaurants where refreshing bacardi rum drinks could be sipped, as officers from various ships gathered together to talk over the events of each day.

In the evenings, wrestling and boxing bouts were held aboard ship, and occasionally, as the weather was mild, a ship's company would stage a "smoker" on the beach, to which the officers and crew of one of the other ships would be invited.

I remember one of these evenings distinctly because during it I witnessed a remarkable example of skill in disposing of a chicken.

An old-timer, a colored cook from one of the ships, proudly took his stand by a table, dressed in an immaculate white suit and his tall, white chef's cap. On the table before him were a cleaver and a couple of sharp knives. At one end stood a chicken tied by one leg. By the cook's side was a bucket of hot water and a small hand forge, brought ashore from the destroyer, and being kept red hot by a couple of men working the blower.

The word "go" was given by the timekeeper.

The cook grabbed the chicken with his left hand, and, as he drew it over, wrung its neck with his right and doused the bird into the hot water. The feathers began to fly, the cleaver worked like lightning—feet, head, entrails, et cetera, flew all over the place. The chicken was sizzling in the pan in exactly forty seconds!

The artist calmly stood by waiting for it to fry, then he scooped it out of the pan and ate it—the whole performance lasting three minutes and forty seconds!

He told me later that he could not do this stunt very frequently, as his mouth was sore for some days from being burned.

The Army and Navy and the Marine Corps frequently are engaged in joint military operations on shore. When so acting, the forces are under the command of the Army.

During World War I I was in command of Navy Base Hospital One, at Brest, France. It had a capacity of about 800. Although our personnel consisted mainly of the Navy, our records were kept according to Army regulations. We admitted no one for treatment but soldiers and Marines.

We were kept full, and after the armistice our main duties were debarkation—getting the sick and wounded back to the United States. During the actual activities we maintained operating teams at the front, and I made frequent inspections of the fighting lines. That was how it happened that on the forenoon of November 11, 1918, I was in General Pershing's headquarters at Chaumont, and, with a telephone at my ear, listened to the last shots of the war being fired up and down the line.

The old saying, "The world is small," is true for all its triteness. One day, while motoring in the Argonne region, we passed a group of soldiers marching back to the rear. They had been relieved from the trenches and were due for a rest.

I was resting along the roadside when the troops were halted for the usual routine fifteen minutes' relaxation. A bedraggled and weary soldier stepped from the ranks and approached me.

Saluting, he asked, "Aren't you Dr. Oman?" I admitted I was, and he told me we had served together four years previously on the U.S.S. *Wyoming*. He reminded me that I had operated on him.

The whistle sounded, he took his place in the line again, and resumed his march. As I watched him move down the road, I wondered where and when we would run across each other again —as happens so often in life in the service.

CHAPTER XVI

# Our New Navy

EVERY OFFICER of the Line who graduates from Annapolis has cost the United States Government $20,000. This is the price of his education for a commission. He has been trained in mathematics, chemistry, and mechanical drawing, instructed in gunnery, ship construction and radio, as well as academic subjects. The midshipman is also taught the duties of an officer—responsibility for the men he commands and how to gain their respect as well as their obedience.

The graduates from Annapolis form the backbone of our new Navy. New, because today it is so much larger than at any time in our country's history, and the expansion has taken place so rapidly. Not long ago we spoke with awe of a "two-ocean navy." Today we have ships in the seven oceans, and it is unlikely that our Navy will be curtailed for many years to come.

Until recent years three fourths of the men who graduated from Annapolis left the Navy within fifteen years of being commissioned. However, money invested in their education as naval officers was not wasted because during a war emergency, many of these men return in the Naval Reserve. Due to the thoroughness of their early training, many of these Reserve officers are able to go back to sea aboard fighting ships and to take their places in the Line.

Among the Navy's enlisted personnel many men do not re-enlist after their first "hitch." As a policy, we do not want 100 per cent re-enlistment. The ideal proportion is two thirds re-enlisted personnel and one third new men, as it insures a flow of men to be trained and gradually builds up an experienced body in the civilian population, which becomes a great national reservoir from which to draw during emergencies.

Like the elephant, the sailor does not forget. He may go back to an office or a factory and become absorbed in the structure of civilian life, but the four years or more he has served in the Navy have given him something which he retains, and on which he can draw, not only in personal emergencies, but when a national crisis arises. When the country needs men to man fighting ships and to build them, he is ready. He finds it extraordinarily easy to hang up his "civies" and put on a uniform again. It feels comfortable; and in a day or two he has slipped into the habits of the old-timer. He belongs. That sense of belonging to one of the services is immensely valuable, not only to the nation as a whole, but to the individual himself.

It is amusing sometimes to see the hangover of old habits. Recently I heard of a successful, middle-aged businessman who went into one of the civilian-defense posts in New York City and remarked, "I have nothing to do this afternoon. I thought I'd like to give a little time to the O.C.D., if that's all right." The lady at the desk said it was, and asked him what he'd like to do. "Well," he said, "if you've no objection, I'll begin by swabbing the deck. I've been coming in here for some time, and this place is pretty dirty." And to her astonishment he remarked, "I learned to *scrub* in the Navy in the last war! Ever since I've never felt easy on dirty decks."

Those of us who knew the old Navy—by which I mean the service before World War I—find many differences between the sailors then and the Navy personnel today. Our new Navy chews gum instead of the wads of oily, black cut plug, a hunk of which used to be in every sailor's pocket. Our new Navy drinks milk, in addition to enormous quantities of Java. They are served in cafeteria style aboard ships and in the naval stations, and the tremendous advance in knowledge of nutrition is nowhere more clearly illustrated than in the amounts of fresh vegetables and fruits the men consume at each mess.

The Navy has always had the reputation of being strict in the health examination of recruits. There are reasons behind these regulations. It is easily understandable why we demand perfect vision of men who are required to stand lookout watch at sea, and who must report accurately everything they see. We began to be strict about examinations of the teeth in the days when the sailor had to bite the end off a cartridge before loading the gun, and when hardtack was served at every mess. We have continued to be particular about the condition of the teeth because we know how they can affect the efficiency of other parts of the body. Civilians sometimes say they are unable to understand why flat feet bar one from the Navy, since the sailor seldom marches. The sailor, however, has to stand watch on deck in all kinds of weather, and a man with painful feet soon becomes unfit for duty. Physical examination of recruits is one of the most important duties of the Medical Department.

The United States Navy is today the largest employer of labor in the world. Aside from our commissioned and enlisted personnel, several hundred thousand civilians are employed in Navy yards and offices. Our Navy yards are highly integrated industrial organizations. The effectiveness of the sea-going Navy is directly dependent upon the shore establishments, and anything—from a strike to an epidemic—which lowers the efficiency of the civil-service personnel may have a serious effect on the fighting force.

The civil-service personnel is physically examined prior to employment, and many are rejected because of physical defects and communicable disease.

As long as the civilian employee is at work on Navy property, his physical welfare is a responsibility of the Navy's Medical Department. We have medical officers who specialize in industrial medicine and who are constantly carrying on research into methods of making working conditions safer and in finding means of cutting down accidents, especially burns and poisoning from fumes, gases, and paint.

Our specialists have been investigating the effect of fatigue on workers as evidenced in lessened production, increased accidents, and absenteeism. From studies made in great industrial plants in Great Britain and the United States, it would seem that a forty-eight-hour week of six days is best for sustained production. Closely related to the study of fatigue is a study of nutrition for the worker. In many of our Navy yards we have canteens where the civil-service personnel can get a hot meal during each work shift. Our medical officers are agreed that workmen who eat cold lunches they bring with them are not so efficient in the last three hours of an eight-hour shift as are men who have eaten a well-balanced, hot meal.

An epidemic of colds which keeps workers at home can be, in its way, as serious as a labor strike, and is as necessary to avoid if possible. Probably nothing in medical research today is more important to winning the war than research into the respiratory diseases.

Those of us who served during World War I have reason to remember the dreadful epidemic of influenza during 1917–18, which was responsible for more deaths than all the other communicable diseases combined. The Navy personnel afloat suffered less from influenza than our personnel ashore, giving proof, if this were needed, that the health conditions aboard our ships are well controlled. Nonetheless, the U.S.S. *Pittsburgh* encountered the disease in Rio, with the result that approximately 80 per cent of her personnel were affected by influenza. The mortality rate was not abnormally high, but the efficiency of the ship's company was cut to 20 per cent. Had the *Pittsburgh* encountered the enemy at the time the epidemic was raging aboard her, she could have put up only a very pitiable fight.

Lobar pneumonia, long known as "the captain of the men of death," which has been fatal to so many in every army and navy of the world, has at last met its master in the discovery of the sulfa drugs, which are efficacious and cheap. Unfortunately, there has appeared on the scene a hitherto-unrecognized form of pneumonia, which is practically unaffected by the sulfa drugs. This disease is known as atypical or virus pneumonia. It is highly infectious, and has lately attained considerable prevalence in the armed forces and among civilians. It is seldom fatal, but it causes much disability and is responsible for the loss of many man-hours. To quote Commander Thomas M. Rivers (MC), U.S.N.R., and director of the hospital of the Rockefeller Institute: "It is not impossible this disease may increase to such an extent as to go down in history as the important infection of the present war."

The purification of water, pasteurization of milk, and mosquito control are relatively simple public-health measures compared to sterilization of the air which workers use in common. A large number of respiratory diseases are air-borne. We must carry our research into the sterilizing of that air. Attempts have been made to use ultraviolet light, but this method does not seem to be entirely practical, and British and American investigators are looking into the possibility of sterilizing air by chemical vapors.

The importance of this and other research on problems of war medicine is proved by the fact that several of the great funds in this country, which have been set up for educational and social services, are allotting large sums to studies bearing on emergency problems. A number of these should contribute materially to our knowledge of shock, to the control of infectious disease, and to aviation medicine. This is a technician's war, and the techniques of medicine are essential to the winning of it.

Heretofore, nationwide preparations for defense and war have always been attended by an increase in the prevalence and virulence of disease. That we have escaped these during the present period is due not to chance or some special blessing showered on the American people, but to the vigilance of the doctors and public-health officials of the United States, and to the increasing intelligence in health matters of our population. We are now reaping the good harvest which has been sown through the years since World War I, in the health articles published through our books, radios, and magazines.

When this war began, there were less than 1,000 regular medical officers in the Navy Medical Corps. Within the twelve months after the raid on Pearl Harbor, between six and seven thousand Reserve medical officers were added to that number. These men have come into the service from civilian life, and are serving on all fronts. They have learned some of the problems of naval medicine and are working at these, shoulder to shoulder with the regular medical officers. It is amazing how rapidly these men adapt themselves to naval life and to the idea of being prepared for any emergency.

The medical officer aboard one of our cruisers, operating in the South Pacific, was deeply imbued with the idea that he should be equipped and ready for a possible disaster at sea. He got an extra life jacket and fitted it with additional pockets, in which he placed some important surgical instruments wrapped in oiled silk, and packets of drugs and surgical supplies, also well protected. As he thought about the possible needs of men who might be shipwrecked for days, it occurred to him that some highly concentrated food would be a good thing for a doctor to have on hand. At the ship's canteen he bought a large stock of chocolate bars, and these, with some vitamin pills, were stowed away in the emergency life jacket.

The doctor kept his jacket hanging on a nail in his cabin. During the daily abandon-ship drills he wore another which was less bulky.

One day the first lieutenant ordered the chief boatswain to make an inventory of all life jackets in the officers' rooms, and to make sure there was only one for each officer. Any extra jackets were to be placed in the crew's stowage space. The boatswain obeyed orders, and finding two jackets in the doctor's cabin, removed one, which happened to be the one in which the doctor had cached his emergency supplies. Shortly afterward there was an abandon-ship drill. The doctor appeared wearing his regulation jacket, quite unaware that one of the aviation gang was wearing the other. When this fellow found that his jacket contained a store of chocolate, of which the canteen had run out ten days before, he was in great glee—that is, until the rest of his life-raft crew discovered it and forced him to share his booty with them. When they dug down into the pockets and found the medical supplies, it was obvious that the miraculous jacket belonged to the doctor, and he came in for a lot of good-humored teasing for his hoarding.

There is no doubt that a total war, a war in which every person —male and female—not only is engaged in some phase of carrying it on, but is also subject to its consequences, places important new responsibilities upon doctors and makes unusual and urgent demands of them. As we look back over the first year and a half of this global contest, a number of activities in the sphere of surgery, medicine, and research, which have been perfected and developed because of the lessons learned during the war, present themselves. I list a few of them:

1. The necessity for accelerating means of transportation of medical and surgical equipment, not only to transfer the wounded very quickly to hospitals in the rear, but to keep up with the rapidly advancing forces. Because of this necessity, mobile base hospitals have been adopted in the Navy, and motorized hospitals in the Army;

2. Airplane ambulances as another means of transporting the wounded quickly, to the rear and to hospital activities. In the advance of the Germans into Poland, many instances are recorded in which wounded men were back in hospitals on German soil within three or four hours;

3. The application of the sulfa group of drugs to open wounds,

which has greatly reduced the mortality, kept down the incidence of gas gangrene, saved countless limbs, and shortened the healing period;

4. The application of Orr-Trueta fixation and the closed method of treating open wounds and compound fractures, which has saved lives and limbs and made transportation more comfortable to the patient. The relatively few dressings have reduced the number of doctors, nurses, and attendants required; the convalescent period is shortened, and far better results are obtained;

5. The immunization of all naval, Marine, and military personnel against yellow fever, typhoid fever, tetanus, and smallpox has anticipated activities in various parts of the world. When required, protection against cholera and typhus is administered;

6. The work of the Navy's medical officers in the peculiar problems of submarines, aviation, surface men-of-war, and epidemiology;

7. The study of the various problems which are encountered in aviation, such as air embolism, the "bends," night blindness, and airsickness, has increased the power and efficiency of our air forces;

8. The marked advances made in the treatment and prophylaxis of shock by the use of blood plasma;

9. The perfection of methods of administering blood substitutes, such as liquid plasma and serum, and dried plasma. Intensive study is progressing in this line;

10. The organization of civilian defense, with its inclusion of the aid of the Red Cross and various other voluntary organizations, which have been developed to meet modern war casualties.

So much, at least, has been accomplished. Much remains to be done. We still need to know a great deal more about shock and how to prevent it. We need to know more about fatigue and its insidious effects on the nervous system. We know how stealthy it is in its approach, and how it numbs the senses of the fighting men, thereby playing into the hands of the enemy. Until we have discovered a means of preventing fatigue, or at least of recognizing its initial symptoms in order to treat it before it does its deadly work, we are vulnerable. We need to know more about the filtrable viruses, and to have means of preventing the infections of which they are the causative agents.

The Navy Department is greatly perturbed over the possibility of introducing the malaria-infected mosquito into areas of the southwest Pacific Ocean where, heretofore, certain islands have been free from this devastating disease. It can readily be appreciated that such an occurrence might be as disastrous as a major naval defeat.

These are some of the problems which face the Medical Department of the Navy at present.

When this war is over, the great majority of our Reserve medical officers will leave the service and return to practice in civil life. These doctors will have an entirely different point of view than if they had not served with the armed forces. They will be enriched in experience, strengthened by discipline and physical hardships, matured by what they have undergone, and infinitely wiser in the ways of human beings. These men are giving much—giving generously and constantly—and, it must be remembered, without remunerative reward. They are pouring their knowledge and their scientific skill into the scales to balance them against disease and death. Not a man in the Army, in the Navy, in the Marine Corps, or in the Coast Guard will return from the war but his homecoming has been made possible by the medical officers of the services.

But, I would add, these medical officers have not only given; they, too, have received. And for what they have received, all those to whom they will minister in the years to come will be exceedingly grateful. Their greatest reward will be the realization that their efforts were in saving, or trying to save, life, and not in taking it.